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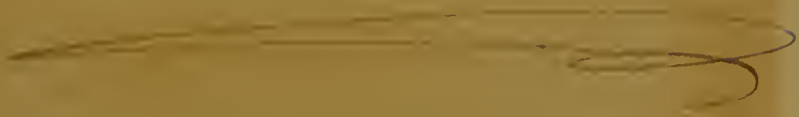


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With the Author's  
Kind regards.







DENTAL MATERIA MEDICA  
PHARMACOLOGY  
AND THERAPEUTICS



DENTAL  
MATERIA MEDICA  
PHARMACOLOGY  
AND  
THERAPEUTICS

BY  
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to the College, &c.

SECOND EDITION



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As a Token of Respect and Gratitude

FOR

MANY ACTS OF KINDNESS RECEIVED WHEN A STUDENT  
AT WESTMINSTER HOSPITAL AND SINCE

THIS BOOK

is Dedicated to

SIR WILLIAM HENRY ALLCHIN

M.D.LOND., F.R.S.E.

BY

THE AUTHOR



## PREFACE TO THE FIRST EDITION

FOR some years past, there has been a need felt for a work on Dental Materia Medica, which would be at once concise, and at the same time supply all the information required in the study and practice of Dental Surgery.

To a large extent, the material of this book is a reproduction of my lectures given at the National Dental Hospital and College for the last eight years ; but, as new drugs are continually being brought forward, an elaboration was necessary to make the work as complete as possible.

Advantage has been taken of the various works on Materia Medica, Pharmacology, and Therapeutics, notably those of Drs. Murrell, Mitchell Bruce, and Phillips, and Dr. Gorgas's work on Dental Medicine.

Under the heading "General" Therapeutics, I have merely mentioned some of the diseases for which the drug is used, further details being out of place in a book of this kind. Under "Dental" Therapeutics, an endeavour has been made to classify the dental uses of a drug according to its pharmacological action.

Dr. Murrell has not only perused the whole of the manuscript, but has given many hints, the value of which cannot be over-estimated by one who is making his initial attempt at authorship.

To add to the usefulness of the volume, there is appended a short chapter on Anæsthetics suitable for Dental Operations. This has been kindly undertaken by my colleague Dr. Maughan, and I feel satisfied from personal experience that his treatment of the subject will be found intelligent and practical.

6, PELHAM CRESCENT,  
SOUTH KENSINGTON.  
*September 1896.*



## PREFACE TO THE SECOND EDITION

AN endeavour has been made to bring this work up to date, and I am much indebted to my old friend Dr. Gaddes, not only for a final revision of the proofs, but also for many valuable suggestions made by him, by which the text has been considerably altered. My colleague at Westminster Hospital, Dr. Carmalt Jones, has most kindly written the chapter on Bacterio-Therapeutics, as applied to Dentistry, for which I tender him my thanks, and the same are also due to my partner, Mr. Wardlaw Fuller, for the great help he has given me in so carefully rearranging, reading through and revising what is herein written.

CHAS. W. GLASSINGTON.

*May* 1911.



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# DENTAL MATERIA MEDICA PHARMACOLOGY AND THERAPEUTICS

## DEFINITIONS

**MATERIA MEDICA** is that branch of science which deals with not only the names of substances employed in the treatment of disease but also their composition, sources, characters, preparations, and doses.

**PHARMACOLOGY** is the science which deals with the action of medicines on healthy and diseased tissue. It means the same as the expression, "The physiological action of drugs" (Murrell).

**THERAPEUTICS** deals with the application or use of substances in the cure, relief, or prevention of disease.

## MATERIA MEDICA

THE drugs which are described in this work are arranged as Inorganic Substances, Synthetic Compounds, and Organic Substances. Under each name is given the composition, sources, characters, preparations, and doses.

### PRESCRIBING

Compared with medical practitioners, a dental surgeon finds it only occasionally necessary to write a prescription.

When this arises, he should be able to do so with a result that is satisfactory both to his patient and himself. The most frequent prescription he is called upon to write is for a tooth-powder. This is a very simple affair. In the majority of cases, three ingredients are wanted—a basis, an antacid, and an antiseptic. Precipitated chalk is used for the first in all cases, light magnesia for the second, carbolic acid or eucalyptus oil for the third.

We can ring the changes on this prescription, *ad infinitum*. For instance, some prefer a saponaceous dentifrice; all that is necessary is to add powdered white soap. Should something gritty be required for occasional use, a little cuttle-fish powder can be put in instead of the soap. If astringency be required, tannic acid or yellow cinchona can be prescribed.

Should an antiseptic powder be wanted, boric and benzoic acid can be used. Flavouring agents are otto of rose, clove oil, eucalyptus, etc.

Mouth-washes are used, as a rule, either for antiseptic or astringent purposes, or both. One of the easiest prescriptions to remember for this purpose is "Listerine," and it is one of the best; but should something more astringent be wanted, tannic acid and rose water can be used. A very pleasant antiseptic mouth-wash will be found on page 140.

At times the dental surgeon has to write a prescription for the relief of neuralgia of dental origin, but in the majority of cases it is preferable, after having examined and treated the teeth, to refer the case to the physician. By so doing he will be keeping well within the limits of dental surgery.

When writing prescriptions it is wise to avoid giving a combination of drugs forming an unsightly mixture. There is seldom any need to write a prescription with *more* than half a dozen ingredients. Two or three will generally meet most cases. The author once saw a prescription for a mouth-wash that contained no fewer than eight antiseptics. The prescriber was evidently determined not to give the bacteria of the mouth much chance of doing any injury to the teeth, or perhaps was trying to prove that dental caries was a purely chemical action.

It is, however, well known that some drugs, when properly combined, materially assist the action of others; but if one is *certain* of the action of a single drug, by all means use it without combination.

When it is desirable that medicine be quickly absorbed, it should be given in the form of a solution

and on an empty stomach. If given in the form of a pill, time is required for its solution.

Many drugs require to be given at certain times; for instance, cod-liver oil should always be given *after* meals, as it is then more readily absorbed and is less likely to cause nausea and vomiting. Drugs which are likely to irritate the mucous membrane of the stomach, such as phosphorus, potassium permanganate and arsenic, are given after meals, though with the last-mentioned drug, if only small doses are given, better effects are produced by giving it before meals (Murrell).

Medicines intended to produce sleep should be given at bedtime, with the exception of sulphonal, which should be taken two or three hours before, as it dissolves slowly. Alkalies, when administered to increase the action of the gastric juice, should be given before meals.

Always flavour children's medicines with syrups or aromatics.

Use care when prescribing for women who are suckling or pregnant.

## INCOMPATIBILITY

The chances of a dental surgeon prescribing an incompatible mixture, compared with those of a physician, are rare, for the simple reason that the former writes one prescription where the latter writes a hundred or more.

The following are a few incompatible drugs :

A mixture of sodium dioxide, glycerin and water may cause an explosion.



A mixture of carbolic acid and sodium dioxide causes a violent explosion.

Creosote explodes when mixed with silver oxide.

Iron with decoction of cinchona forms a nasty black-looking mixture.

A mixture of potassium chlorate, tincture of the ferric chloride, and glycerin, has been known to explode if kept in a warm place.

Potassium permanganate and glycerin form a dangerous combination.

Chromic acid explodes if mixed with glycerin.

Tannic acid interferes with the action of salicylic acid.

In many cases drugs are physiologically incompatible by reason of one drug acting on the other and rendering it inert. On the other hand, incompatible mixtures are sometimes prescribed in order to obtain some pharmacological advantage.

## PRESCRIPTION WRITING

In former years all prescriptions were written in Latin, including the directions to the patient as to how the drug was to be taken. As this caused mistakes at times, the latter part of the prescription is now, as a rule, written in English.

All prescriptions start with the sign *R*, an abbreviation for *recipe*, "take." This is followed by the drugs required, which should be written in the genitive case. In the majority of cases, however, the name of the drug is abbreviated, *e.g.* "Liq. Hydrarg. Perchlor." To the right-hand side is put the quantity required in Roman figures and apothecary signs, though it is much

better to minimise any error being made, and write them in English as follows: "20 grains," "1 ounce," "2 drachms," etc.

Where there is the slightest chance of one drug being mistaken for another, always write it in full. For instance, "Acid. Hydroc. dil." may either mean dilute *hydrochloric* acid or dilute *hydrocyanic* acid.

A prescription consists of four parts, viz., The *superscription*, which consists of the sign  $\mathcal{R}$ ; the *inscription*, which contains the names and doses of the drugs prescribed; the *subscription*, directions to the dispenser; the *signature*, directions to the patient.

It is customary to arrange the constituents of the inscription under four headings, viz., the *basis* or active ingredient, the *adjuvant* or auxiliary, the *corrective*, to limit or modify the action of the two former, and the *vehicle* or *excipient*, to bring the whole to a convenient form of administration. In addition to these, one must not forget some *flavouring* agent when ordering a mixture or draught.

It is, however, not absolutely necessary that every prescription should contain all these. For instance, in the following there is no need for a corrective:

Superscription  $\mathcal{R}$ .

Inscription	{	Ammonii Chloridi,	$\mathfrak{z}\text{ij}$ (Basis).
		Tincturæ Gelsemii,	$\mathfrak{z}\text{j}$ (Adjuvant).
		Spiritûs Chloroformi,	$\mathfrak{z}\text{iiss}$ (Flavouring
			[Agent).
		Aquæ, ad	$\mathfrak{z}\text{vj}$ (Vehicle).

Subscription.—Misce, fiat mistura.

Signature.—Two tablespoonfuls to be taken every two or three hours.

Patient's Name.

Practitioner's Name or

Date.

Initials.

It will perhaps be noticed that the prescriptions in this book are written in English. This is done purposely in the endeavour to prevent any errors occurring.

*Some of the abbreviations used in prescription writing*

<i>Abbreviations.</i>	<i>Latin word.</i>	<i>English word.</i>
āā . . .	Ana (Gr.) . . .	Of each.
Ad lib. . . .	Ad libitum . . .	At pleasure.
Ad saturand. . .	Ad saturandum . .	Until saturated.
Aq. . . . .	Aqua . . . . .	Water.
Aq. dest. . . .	Aqua destillata . .	Distilled water.
Aq. ferv. . . .	Aqua fervens . . .	Hot water.
Aq. tepid. . . .	Aqua tepida . . . .	Warm water.
Co. . . . .	Compositus . . . .	Compound.
Coeh. . . . .	Coehlear . . . . .	A spoonful.
Coeh. mag. . . .	Coehlear magnum . .	A tablespoonful.
Coeh. parv. . . .	Coehlear parvum . .	A teaspoonful.
C. . . . .	Cum . . . . .	With.
Ext. . . . .	Extraetum . . . . .	An extraet.
F. or Ft. . . . .	Fiat vel fiant . . .	Let there be made.
Garg. . . . .	Gargarisma . . . .	A gargle.
Haust. . . . .	Haustus . . . . .	A draught.
Infus. . . . .	Infusum . . . . .	An infusion.
M. . . . .	Misce . . . . .	Mix.
Mist. . . . .	Mistura . . . . .	A mixture.
Pil. . . . .	Pilula vel pilulæ . .	A pill or pills.
Pulv. . . . .	Pulvis vel pulveres .	A powder or powders.
q. s. . . . .	Quantum suffieit . .	As much as is suffieient.
R. . . . .	Reeipe . . . . .	Take thou.
Rad. . . . .	Radix . . . . .	A root.
Sig. . . . .	Signa . . . . .	Mark thou.
Spt. . . . .	Spiritus . . . . .	Spirit.
Ss. . . . .	Semis . . . . .	The half.
Stat . . . . .	Statim . . . . .	Immediately.
Syr. . . . .	Syrupus . . . . .	Syrup.
Tinct. . . . .	Tinetura . . . . .	A tincture.

*Signs and symbols of prescription writing*

lb.	.	.	.	Libra	.	.	.	A pound.
℥	.	.	.	Uncia	.	.	.	An ounce.
℥	.	.	.	Drachma	.	.	.	A drachm.
℥	.	.	.	Scrupulum	.	.	.	A scruple.
f. ℥	.	.	.	Fluiduncia	.	.	.	A fluid ounce.
f. ℥	.	.	.	Fluidrachma	.	.	.	A fluid drachm.
℥	.	.	.	Minim	.	.	.	A drop.
Gr.	.	.	.	Granum	.	.	.	A grain.
Gtt.	.	.	.	Gutta vel Guttae	.	.	.	A drop or drops.
O.	.	.	.	Octarius	.	.	.	A pint.
C.	.	.	.	Congius	.	.	.	A gallon.

## WEIGHTS AND MEASURES

The present recognised weights of the British Pharmacopœia are the grain, the ounce, and the pound. Two others are unofficially used, viz., the drachm and the scruple, though the latter is now nearly discarded.

**Official**

1 grain.

1 ounce = 437·5 grains.

1 pound = 16 ounces = 7000 grains.

**Non-official**

1 scruple = 20 grains.

1 drachm = 60 grains.

**Measures of Capacity**

1 minim.

1 fluid drachm = 60 minims.

1 fluid ounce = 8 fluid drachms.

1 pint = 20 fluid ounces.

1 gallon = 8 pints.

RELATION OF MEASURES TO WEIGHTS

	Grains of water.
1 minim is the measure of	0·91
1 fluid drachm           ,,	54·68
1 fluid ounce           ,,	437·5
1 pint                   ,,           1·25 pounds or	8750·0
1 gallon               ,,           10 pounds or	70000·0

**Domestic Measures.** When using harmless drugs one sometimes tells a patient to take a few drops of one, or a teaspoonful, tablespoonful, or wine-glass of another. As these articles vary in size, the following is an approximate measurement of each :

1 teaspoonful	= 1 fluid drachm.
1 dessertspoonful	= 2 fluid drachms.
1 tablespoonful	= 4 fluid       ,,
1 sherry glass	= 2 fluid ounces.
1 tea-cup	= 4 fluid       ,,

It is much better, however, to use a graduated measure glass.

**The Metrical System.** This system is official on the Continent and in the British Pharmacopœia for the making of drugs and preparations.

**Measures of Mass**

1 Milligramme	= the thousandth part of 1 gramme or 0·001 gramme.
1 Centigramme	= the hundredth part of 1 gramme or 0·01 gramme.
1 Decigramme	= the tenth part of 1 gramme or 0·1 gramme.
1 Gramme	= weight of a millilitre of distilled water at 4° C. (39·2° F.) or 1·0 gramme.

- 1 Dekagramme = ten grammes or 10·0 grammes.  
 1 Hectogramme = one hundred grammes or 100·0 grammes.  
 1 Kilogramme = one thousand grammes or 1000·0 grammes.

### Measures of Capacity

- 1 Millilitre = the volume at 4° C. of 1 gram. of water.  
 1 Centilitre =            "            "       10       "  
 1 Decilitre =            "            "       100       "  
 1 Litre =                "            "       1000       " (1 Kilo.)

## THE PRINCIPLES OF DOSAGE

There is a wide difference of opinion as regards dosage. Some men believe in the ordinary doses of a drug, at stated times, such as every four hours, or three times a day; whilst others pin their faith to smaller doses at more frequent intervals. Where one practitioner would give five drops of tincture of aconite every three or four hours, another prefers to give drop doses every half-hour. In the latter case, one might be accused of gradually approaching the ground of Homœopathy. But this would not be at all true, for it is well known that in certain cases greater advantage may be obtained by giving small doses of a drug frequently repeated, than by administering it in the orthodox manner of the "B. P." Frequently far better results are seen when one large dose is prescribed. This is evident with drugs like quinine and opium. With the former, a single dose of 10 or 15 grs. will frequently reduce high temperature, and in the latter, large doses will bring about sleep, whilst smaller ones would only excite and annoy the patient.

The student may complain that it is very difficult to remember the various doses of drugs. This is not so. By reference to the Posological Table, he will see that infusions, decoctions, tinctures, pills, etc., are always administered in certain quantities, with a few exceptions. He has, therefore, only to remember that the majority of infusions are given in doses of 1 to 2 ounces, tinctures  $\frac{1}{2}$  to 2 drachms, decoctions 1 to 2 ounces, pills 5 to 10 grains, etc., and then learn the exceptions, and also those drugs which are given in very small doses, such as aconitine, arsenic, phosphorus, etc.

Children require smaller doses than adults, with certain exceptions, viz., mercury, arsenic, and belladonna; but even in these cases the dose must be gradually increased.

Be careful when ordering drop doses, as the size of a drop differs according to the density of the fluid, and the form of the lip of the vessel from which it is dripped.

## POSOLOGICAL TABLE

Acids, dilute mineral (hydrochloric, nitric, nitro-hydrochloric, phosphoric, aromatic sulphuric, sulphuric) . . .				5 — 20 min.
Acidum aceticum dilutum . . .				$\frac{1}{2}$ — 2 fl. dr. diluted.
„	arseniosum	. . .	. . .	$\frac{1}{60}$ — $\frac{1}{15}$ gr.
„	benzoicum	. . .	. . .	5 — 15 „
„	boricum	. . .	. . .	5 — 15 „
„	carbolicum	. . .	. . .	1 — 3 „ in pill



Acidum carbolicum liquefactum . . .	1 — 3 min.	
		largely diluted.
„ gallicum . . . . .	5 — 15 gr.	
„ hydrobromicum dilutum . . . . .	15 — 60 min.	
„ hydrocyanicum dilutum . . . . .	2 — 6 „	
„ salicylicum . . . . .	5 — 20 gr.	
„ tannicum . . . . .	2 — 5 „	
Adrenalin chloride solution . . . . .	5 — 30 min.	
Æther . . . . .	10 — 30 „	
		repeated administrations.
„ . . . . .	40 — 60 min.	
		single dose.
Alumen . . . . .	5 — 10 gr.	
Ammonii carbonas (as a stimulant) . . . . .	3 — 10 „	
„ „ (as an emetic) . . . . .	30 „	
		freely diluted.
„ chloridum . . . . .	5 — 20 gr.	
Amyl nitris (by inhalation) . . . . .	2 — 5 min.	
„ „ (by mixture) . . . . .	$\frac{1}{2}$ — 1 „	
Antifebrin . . . . .	1 — 3 gr.	
Antipyrine . . . . .	5 — 20 „	
Apomorphinæ hydrochloridum (emetic). . . . .	$\frac{1}{20}$ — $\frac{1}{10}$ „	
„ „ (expectorant). . . . .	$\frac{1}{10}$ — $\frac{1}{4}$ „	
Argenti nitras . . . . .	$\frac{1}{4}$ — $\frac{1}{2}$ „	
		in pill.
„ oxidum . . . . .	$\frac{1}{2}$ — 2 gr.	
Aspirin . . . . .	10 — 15 „	
Bismuthi carbonas, oxidum, sub-		
nitras . . . . . each	5 — 20 „	
Borax . . . . .	5 — 20 „	
Butyl-chloral hydras . . . . .	5 — 20 „	
Calcii carbonas præcipitatus . . . . .	10 — 60 „	
„ chloridum . . . . .	5 — 15 „	



Calcii hypophosphis . . . . .	3 — 10 gr.
Calx sulphurata . . . . .	$\frac{1}{4}$ — 1 „
Camphora . . . . .	2 — 5 „
Capsicum . . . . .	$\frac{1}{2}$ — 1 „
Carbo animalis (as an antidote) . . . . .	$\frac{1}{2}$ — 2 oz.
„ ligni . . . . .	60 — 120 gr.
Chloral hydras . . . . .	5 — 20 „
Cocainæ hydrochloridum . . . . .	$\frac{1}{5}$ — $\frac{1}{2}$ „
Creosotum . . . . .	1 — 5 min.
Creta præparata . . . . .	10 — 60 gr.
Cupri sulphas (astringent) . . . . .	$\frac{1}{4}$ — 2 „
„ „ (emetic) . . . . .	5 — 10 „
Ergotin . . . . .	2 — 8 „
Extractum ergotæ liquidum . . . . .	10 — 30 min.
Gelsemine . . . . .	$\frac{1}{60}$ — $\frac{1}{20}$ „
Glycerinum . . . . .	1 — 2 fl. dr.
Hydrargyri perchloridum . . . . .	$\frac{1}{32}$ — $\frac{1}{16}$ gr.
„ subchloridum . . . . .	$\frac{1}{2}$ — 5 „
Hydrargyrum cum Cretâ . . . . .	1 — 5 „
Infusa, all official infusions . . . . .	1 fl. oz.
except infusum digitalis . . . . .	2 — 4 fl. dr.
Injectio apomorphinæ hypodermica . . . . .	5 — 10 min.
„ cocainæ „ . . . . .	2 — 5 „
„ ergotæ „ . . . . .	3 — 10 „
„ morphinæ „ . . . . .	2 — 5 „
Iodoform . . . . .	$\frac{1}{2}$ — 3 gr.
Iodol . . . . .	1 — 3 „
Ipecacuanha (emetic) . . . . .	15 — 30 „
„ (expectorant) . . . . .	$\frac{1}{2}$ — 2 „
Liquor atropinæ sulphatis . . . . .	$\frac{1}{2}$ — 1 min.
„ calcis . . . . .	1 — 4 fl. oz.
„ „ saccharatus . . . . .	20 — 60 min.
„ ferri perchloridi . . . . .	5 — 15 min.

Liquor hydrargyri perchloridi . . .	$\frac{1}{2}$ — 1 fl. dr.
„ hydrogenii peroxidi . . .	$\frac{1}{2}$ — 2 „
„ morphinæ acetatis . . .	10 — 60 min.
„ „ hydrochloridi . . .	10 — 60 „
„ „ tartratis . . .	10 — 60 „
„ potassæ . . .	10 — 30 „
„ potassii permanganatis . . .	2 — 4 fl. dr.
Magnesia levis . . .	} 10 — 60 gr.
„ ponderosa . . .	
Magnesii carbonas levis . . .	
„ „ ponderosus . . .	} 1 — 4 dr.
„ sulphas . . .	
Menthol . . .	$\frac{1}{2}$ — 2 gr.
Misturæ (all) . . .	$\frac{1}{2}$ — 1 or 2 fl. oz.
Morphinæ acetas, hydrochloras, tartras. . .	$\frac{1}{8}$ — $\frac{1}{2}$ gr.
Naphthol . . .	3 — 10 „
Oleum crotonis . . .	$\frac{1}{2}$ — 1 min.
„ eucalypti . . .	$\frac{1}{2}$ — 3 „
„ morrhuæ . . .	1 — 4 fl. dr
„ olivæ . . .	1 — 8 „
„ phosphoratum . . .	1 — 5 min.
„ ricini . . .	1 — 8 fl. dr.
„ terebinthinæ . . .	2 — 10 min.
Opium . . .	$\frac{1}{2}$ — 2 gr.
Orthoform . . .	$1\frac{1}{2}$ — 3 „
Pepsin . . .	5 — 10 „
Phenacetinum . . .	5 — 10 „
Phenazonum . . .	5 — 20 „
Phosphorus . . .	$\frac{1}{100}$ — $\frac{1}{20}$ „
Pilulæ, all official pills . . .	4 — 8 „
<i>Except—</i>	
Pilula ferri . . .	5 — 15 gr.
„ phosphori . . .	1 — 2 „

Pilula plumbi cum opio . . . . .	2 — 4 gr.
„ quininæ sulphatis . . . . .	2 — 8 „
„ saponis composita . . . . .	2 — 4 „
Plumbi acetas . . . . .	1 — 5 „
Potassii bicarbonas . . . . .	5 — 30 „
„ bromidum . . . . .	5 — 30 „
„ carbonas . . . . .	5 — 20 „
„ chloras . . . . .	5 — 15 „
„ iodidum . . . . .	5 — 20 „
„ nitras . . . . .	5 — 20 „
„ permanganas . . . . .	1 — 3 „
„ sulphas . . . . .	10 — 40 „
Pulvis cretæ aromaticus . . . . .	10 — 60 „
„ „ cum opio . . . . .	10 — 40 „
„ glycyrrhizæ compositas . . . . .	60 — 120 „
„ ipecacuanhæ compositus . . . . .	5 — 15 „
„ tragacanthæ compositus . . . . .	20 — 60 „
Quininæ, hydrochloridum, sulphas . . . . .	1 — 10 „
Resorcin . . . . .	3 — 8 „
Sodii biboras . . . . .	5 — 20 „
„ bicarbonas . . . . .	5 — 30 „
„ bromidum . . . . .	5 — 30 „
„ salicylas . . . . .	10 — 30 „
Sulphonal . . . . .	10 — 30 „
Sulphur . . . . .	20 — 60 „
Thymol . . . . .	$\frac{1}{2}$ — 2 „
Tincturæ, all official tinctures . . . . .	$\frac{1}{2}$ — 1 dr.
<i>Except—</i>	
Tinctura aconiti . . . . .	5 — 15 min.
„ belladonnæ . . . . .	5 — 15 „
„ cannabis indicæ . . . . .	5 — 15 min.
„ capsici . . . . .	5 — 15 „
„ chloroformi et morphinæ . . . . .	5 — 15 „

Tinctura digitalis	.	.	.	5 — 15 min.
„ ferri perchloridi	.	.	.	5 — 15 „
„ gelsemii	.	.	.	5 — 15 „
„ iodi	.	.	.	2 — 5 „
„ lobeliæ ætherea	.	.	.	5 — 15 „
„ nucis vomicæ	.	.	.	5 — 15 „
„ opii	.	.	.	5 — 15 „
Trochisci	.	.	.	1 — 3 or 4
Vinum antimoniale	.	.	.	10 — 30 min.
„ „ (as emetic)	.	.	.	2 — 4 fl. dr.
„ ipecacuanhæ (emetic)	.	.	.	4 — 6 „
„ „ (expectorant)	.	.	.	10 — 30 min.
Zinci oxidum	.	.	.	3 — 10 gr.
„ sulphas (as a tonic)	.	.	.	1 — 3 „
„ „ (as an emetic)	.	.	.	10 — 30 „

## POSOLOGICAL TABLE FOR CHILDREN

For a child—

Under 1 year old give  $\frac{1}{15}$  to  $\frac{1}{12}$  of the dose for an adult.

„ 2 years	„	$\frac{1}{8}$	„	„
„ 3 „	„	$\frac{1}{6}$	„	„
„ 4 „	„	$\frac{1}{4}$	„	„
„ 7 „	„	$\frac{1}{3}$	„	„
„ 12 „	„	$\frac{1}{2}$	„	„

From this age the dose is gradually increased till the patient reaches adult life, when the full dose can be given.

*To prepare effervescing draughts*

17 grains of citric acid, or 18 grains of tartaric acid, or $\frac{1}{2}$ a fluid ounce of fresh lemon juice	Neutralise	$\left\{ \begin{array}{l} 25 \text{ grains potass. bicarb.} \\ 20 \text{ grains sodii bicarb.} \\ 15 \text{ grains ammon. carb.} \\ 13 \text{ grains magnes. carb.} \end{array} \right.$
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TABLE showing the proportion of active ingredients contained in some important preparations

Injectio apomorphinæ hypodermica	1 gr. in 110 min.
„ cocainæ	„ „ 10 „ „ 110 „
„ ergotæ	„ „ 33 „ „ 110 „
„ morphinæ	„ „ 5 „ „ 110 „
Liquor arsenicalis, morphinæ acc-	
tatis, morphinæ hydrochloridi	1 „ „ 110 „
Oleum phosphoratum . . .	1 per cent.
Pilula phosphori . . .	1 in 50
„ plumbi cum opio . . .	1 part in 8 (nearly)
Pulvis cretæ aromaticus cum opio .	1 „ 40
„ ipecacuanhæ compositus .	1 „ 10
Tinctura opii . . .	1 gr. in 15 min.
„ „ ammoniata . . .	1 „ „ 96 „
Vinum antimoniale . . .	1 „ „ $\frac{1}{2}$ fl. oz.

## PHARMACOLOGY

MEDICINES, when taken into the system, undergo various changes, which in a great measure depend upon, and are modified by, what we eat and drink, the temperature of the body, the state of the system, and their tendency to combine with other substances and form fresh compounds. Some drugs will be considerably altered by the action of other substances; for instance, in a case of poisoning by corrosive sublimate, by giving white of egg at once an insoluble albuminate of mercury is formed, which renders the poison harmless. On the other hand, a patient has, in years gone by, suffered from syphilis and was under mercurial treatment for some time, and the mercury has accumulated in his system in the form of an albuminate. After a lapse of time, as he has developed some tertiary symptoms of the disease, he consults another practitioner, who gives him potassium iodide, and after he has taken a few doses, symptoms of mercurial poisoning occur. This is caused by the potassium iodide rendering the insoluble albuminate of mercury soluble, so that a mercuric iodide is formed, which is one of the most active forms of mercury.

The rapidity with which drugs enter the blood depends in a great degree on their composition. Certain substances (*crystalloids*) pass through animal

membranes very easily, whilst others (*colloids*) do so very slowly or not at all. For instance, arsenic is a crystalloid and, on account of this, great care must be exercised when using it for dental troubles.

Some drugs, when properly administered, simply modify the vital conditions of the system; but at times, either from some unknown cause or from being improperly used, will cause death. Take, for instance, any one of the general anæsthetics, which, when administered up to a certain stage, produces unconsciousness, and so acts as a medicinal agent; but if the drug be pushed, it would in all probability cause death, and so act as a poison. Some drugs not only destroy life, but also destroy the parts with which they come in contact, as in the case of the corrosive poisons; others cause death without the destruction of tissue.

When pharmacological effects of drugs occur in the parts to which they are applied they are called *topical* or *local* effects; when in more or less distant parts, they are *remote*. For example, in neuralgia, not of dental origin, by applying a liniment of chloroform and aconite, relief may be obtained. This would be a *local* effect. Again, drugs which act on the stomach and intestines, such as emetics and purgatives, are obviously *local* in their action. In a case of dropsy, on the other hand, by giving drugs to act on the liver, kidneys, or heart (according to the cause), a *remote* effect would be obtained. Some drugs have a *specific* action on certain tissues and organs, *e.g.* alcohol on the brain, strychnine on the spinal cord, cantharides on the kidneys. Others operate through nervous agency. Briefly speaking, there are two sets of nerves—*afferent*

and *efferent*. The former convey impressions to the nerve-centre, whilst the latter transmit impressions *from* the centre to muscles, glands, vessels, etc. It is by means of these afferent or sensory nerves that the effects of drugs are conveyed to the brain, whereby an excitement of a nerve-centre is caused, and a *reflex action* is transmitted along the efferent nerves, causing certain phenomena to occur.

When medicines enter the circulation they are conveyed by it to various parts of the body, and in their transit may cause alterations in the character and composition of the blood. For instance, iron will produce not only a change in the colour of the red corpuscles, but an increase in their number.

Medicines, poisons and other substances, after they have been conveyed to the different tissues and organs by the blood, are got rid of by the excretory organs, which expel them from the system. Some drugs pass out by one organ, some by another, *e.g.* camphor and alcohol by the lungs and kidneys, saline matters by the kidneys and skin, and the alkaline bromides have been found in the urine and saliva five minutes after a dose of 15 grains (Rabuteau).

The effects of medicines are greatly modified by the form in which they are administered, *e.g.* morphine is far more active in solution than when given in the solid form. On this account, and because the smallness of the dose does not upset the stomach, it is used hypodermically. Again, with apomorphine if used hypodermically it acts as an emetic, while if given internally it acts as an expectorant. When the prompt action of a drug is required it should not be given in the form of a pill, as time would be required for dissolving the pill



mass (unless the pill is made with syrup or some other substance which will allow of its prompt disintegration) before any effect of the drug could be obtained.

**Pharmaceutical Combination** also alters the action of drugs. For instance, with diuretics, three or four members of this group often act beneficially where only one would produce little or no effect. It also corrects their action, as in syphilis, when opium is given with mercury, to prevent the purgative action of the latter, so that the patient comes thoroughly under the influence of the drug. Then again, by the joint action of two drugs an effect is gained which could not be otherwise obtained by one only, *e.g.* opium and ipecacuanha act quite differently when prescribed alone, but when combined in the form of Dover's powder, form one of the best diaphoretics we have.

The effects of medicines are also modified by—

(a) **Age.** In young children only small doses should be given (see p. 16), and as we come to old age, so again must small doses be administered. This is a general rule, but there are exceptions. For instance, when it is absolutely necessary to give opium to young children care must be taken, but mercury and its preparations can be prescribed for a long time for such subjects without the *usual effects of mercurialisation* being produced. It is an important fact that children can often take, not only with impunity, but even with decided benefit, quantities of active remedies which will correspond to the full adult dose. In cases of chorea the author has seen children start with three minims of liq. arsenicalis, which has been gradually increased up to thirty.

(b) **Climate** considerably influences the effects of drugs. Narcotics act more energetically in hot climates ; calomel the reverse.

(c) **Disease.** Different diseases exercise great influence on the effect of drugs. This is well seen in tetanus, when opium has hardly any effect in allaying the spasms.

(d) **Toleration and Habit.** Some drugs lose their effects when continued for any length of time. This is notably the case with narcotics, the doses of which have to be increased from time to time in order to obtain the same effect. Arsenic has the same peculiarity, as is seen with the arsenic eaters of Styria, who, by the long-continued use of the drug, are at last able to take in one dose what would be sufficient to kill several people.

(e) **Idiosyncrasy.** This is a peculiar susceptibility of some individuals to the action of certain drugs, *e.g.* a patient will become profusely salivated with a grain of calomel, another has violent headache and ringing in the ears from quinine, and a third becomes furiously excited by opium. On the other hand, many are able to take large doses of a drug without its having any effect whatever.

(f) **Mind.** That the mind influences the effects of medicines on the system there can be no doubt. How often do we give the same drug for the same disease to two different patients, and find that the one who is naturally of a cheerful disposition and who believes he will obtain relief, soon gets well, whilst the other, who is of a morose and moody disposition, obtains no relief whatever !

(g) **Sex.** Females are subjected to conditions and diseases which never happen to man, therefore the

administration of drugs at certain times must be modified or avoided. During the periods of menstruation, pregnancy, and lactation, great care must be taken when prescribing certain drugs, and in the two last-mentioned conditions the question of careful dieting must also be taken into consideration.

## THE CLASSIFICATION OF DRUGS

The various authors on *materia medica* and therapeutics have each given a different classification of medicinal substances; but, as in a work of this kind there is no need to consider *all* the drugs in the pharmacopœia, the author has simply placed each form of drug in alphabetical order, special stress being laid on those which are applicable to dental surgeons, whilst those which are not of great dental interest are but lightly touched upon.

**Absorbents or Desiccatives.** Substances which check or dry up secretions and foul discharges. Examples: charcoal, tannin, starch, zinc oxide, etc.

**Alteratives.** Medicines which alter certain morbid conditions of the various systems of the body and restore healthy functions. Examples: the preparations of mercury, iron, potassium iodide, potassium chlorate, ammonium chloride, nitro-hydrochloric acid, etc.

**Anæsthetics.** Medicinal agents which are used in surgical practice for the prevention of pain. They are divided into general and local anæsthetics.

*General Anæsthetics* are in the form of vapours or gases applied by inhalation, and possess the power of temporarily suspending animation, rendering the patient insensible to pain, and relaxing muscular

spasm. Examples : chloroform, ether, nitrous oxide gas, methylene, ethidene di-chloride and the A.C.E. mixture.

*Local Anæsthetics* cause loss of pain to the part to which they are applied by their action on the sensory nerves. Examples : novocain, alypin, eucaine, cocaine, ether spray, etc.

A full description of *Pressure Anæsthesia* will be found on page 251.

**Analgesics and Anodynes.** Allay pain and diminish spasm. Examples : aconite, antifebrin, antipyrine, atropine, belladonna, dilute carbolic acid, morphine, opium, phenacetin, etc.

**Anhidrotics.** Check perspiration. Examples : tannic acid, zinc oxide (internally). Sponging the body with cool, tepid, or hot water, or with solutions of dilute acetic acid, sulphuric acid, or tannic acid.

**Antacids.** Neutralise acidity of the various secretions and the blood. In dental practice they are used in the form of mouth-washes and tooth-powders to prevent the deleterious action of acid fluids on the mouth and acid medicines on the teeth. Examples : sodium and potassium bicarbonate, magnesium carbonate, precipitated chalk, lime-water, etc.

**Anthelmintics.** Destroy and expel worms from the alimentary canal. Examples : santonin, male fern, turpentine, gamboge, common salt, etc.

**Antiemetics.** Arrest vomiting. Examples : creosote, dilute hydrocyanic acid, chloroform, chloral, lime-water, ice, etc.

**Antidotes.** Agents which prevent or counteract the action of poisons (see Poisons used by dentists and their antidotes, page 277).

**Antiperiodics.** Drugs which interrupt periodical attacks of disease. Example: quinine, in neuralgia.

**Antipyretics** (Febrifuges). Reduce high temperatures. Examples: quinine, salicin, phenazone, phenacetin, aconite, alcohol, etc.

**Antiseptics.** Prevent putrefaction by arresting the growth of, or destroying organisms, and render inert the chemical activity of certain materials which give rise to fermentation and decomposition. When they destroy microbes and disease germs they are called *germicides*. Examples: mercuric chloride, carbolic acid, formic aldehyde, boracic acid, hydrogen peroxide, sodium peroxide, thymol, creosote, iodoform, eucalyptus, potassium permanganate, clove oil, iodine, etc.

Some antiseptics are also coagulants of albumen, such as carbolic acid, creosote, zinc chloride; so when the antiseptic is required to penetrate the dentinal tubes these drugs should not be used.

A convenient division of dental antiseptics is as follows:

<i>Poisonous and irritating.</i>	<i>No destructive properties.</i>	<i>Mechanical.</i>
Mercuric chloride.	Essential oils.	Engine burr.
Carbolic acid.	Hydrogen per- oxide.	Hot-air syringe.
Formalin.	Iodoform and its substitutes.	
	Boracic acid.	
	Charcoal.	

**Antisialics.** Drugs which diminish or check the secretions of the salivary glands. Examples: Atropine, physostigma (in large quantities).

**Antispasmodics.** Allay muscular spasm and compose irregular action of the nervous system. Examples : asafetida, camphor, valerian, potassium bromide.

**Aperients.** See **Cathartics**.

**Astringents.** Medicines which cause contraction of blood-vessels and the tissues to which they are applied. They also check excessive discharges and prevent the growth of granulation tissue and are generally divided into *vegetable* and *mineral*, the astringency of the former being due to tannic acid, whilst the latter diminish the alkalinity of the blood and increase its coagulability. Examples : of the *vegetable* astringents, tannic and gallic acids, rhatany, catechu, matico. Of the *mineral* astringents, most salts of iron, alum, and the mineral acids.

**Bleaching Agents.** Drugs which are employed in dentistry to remove the stains of a "dead" or otherwise discoloured tooth. Examples : chlorinated lime, hydrogen peroxide, sodium peroxide, pyrozone, sodium sulphite, boracic acid, and acetozone.

**Carminatives.** Substances which dispel flatulence and allay pain and spasm of the stomach and intestine. Examples : all aromatics, asafetida, camphor, ether, carbolic acid, charcoal, cajuput oil, etc.

**Cathartics.** Medicines which cause an increased action of the bowels. They can be briefly described under three headings :

(1) *Aperients* or *Laxatives* cause a slightly increased peristaltic action of the intestines and softening of the fæces, and so mildly evacuate the bowels. Examples : figs, prunes, cassia, magnesia, compound liquorice powder, olive oil, magnesium sulphate.

(2) *Purgatives.* Cause, in addition to the above, a greatly increased peristaltic action and more copious



evacuations. Examples : aloes, jalap, rhubarb, senna, castor oil, etc.

(3) *Drastics*. These are still more violent in their action and generally cause not only the neighbouring viscera to secrete a greater quantity of their respective fluids, but a copious elimination of the fluids from the intestinal glands. They are generally accompanied with pain and griping. Under this heading would come such drugs as calomel, colocynth, croton oil, podophyllin.

There are many other forms of *cathartics*, the action of which is unnecessary to mention in a work of this kind, and in addition they have several adjuncts, such as nux vomica, strychnine and ferrous sulphate, which act by giving tone and contractile power to the intestine.

**Caustics.** Substances which are capable of destroying living tissues and which destroy or arrest the activity of organic poisons, those producing an eschar, being termed *escharotics*. Examples : the mineral acids, caustic alkalies, zinc chloride, strong solution of ammonia, arsenic, silver nitrate.

**Colouring Agents.** Substances employed to communicate their peculiar colour to pharmaceutical preparations. In dental practice they are used for colouring tooth-powders. Examples : cochineal, saffron, rose pink.

**Counter-Irritants.** Substances which are applied to a part to produce external irritation in order to relieve pain or diseased action in another. They are divided into three varieties according to the amount of irritation they set up, viz., rubefacients, vesicants, pustulants.

(1) *Rubefacients*. Agents which cause increased redness and heat to the parts to which they are applied. Examples : poultices, mustard, ammonia, capsicum, turpentine, antiphlogistine, etc.

(2) *Vesicants (Epispastics, Blisters)*. Agents which act in a greater degree than rubefacients and cause inflammation, followed by an effusion of serum beneath the cuticle. In children, whenever it is necessary to use a blister, it is advisable to apply it just long enough to redden the skin, and then complete the vesication with a poultice. In cases of neuralgia, a "flying" blister to the temple, cheek, or behind the ear, will often give relief, although if the neuralgia is dependent on toothache the latter will remain whilst the former disappears. Examples: cantharides, ammonia (if long continued), glacial acetic acid, iodine, etc.

(3) *Pustulants (Suppurants)*. These act in a greater degree than the former, and when rubbed or painted on the skin produce a crop of pimples. Examples: croton oil, tartar emetic, silver nitrate (in strong solution).

**Demulcents.** Internal remedies which soothe and soften the mucous membrane of the alimentary canal. Examples: simple drinks, such as warm water, toast and water, barley-water, gelatin, isinglass, tragacanth, syrups, etc.

**Deodorisers.** Agents which absorb gases and destroy infectious and foetid odours. Examples: carbolic acid, creosote, chloride of lime, potassium permanganate, charcoal, etc.

**Desiccatives.** See **Absorbents**.

**Detergents.** Cleanse ulcers and suppurating wounds by acting either as stimulants or emollients. Examples: borax, alum, charcoal, etc.

**Devitalising Agents.** Drugs which are used to devitalise the dental pulp. The chief of these are arsenic and cobalt, but since the introduction of pressure anæsthesia, cocaine, novocain, alypin and kindred drugs must be



included, as without them this practically mechanical treatment could not be carried out.

**Diaphoretics** (*Sudorifics*). Medicines which increase the amount of perspiration. Examples : jaborandi and its alkaloid pilocarpine, liquor ammonii acetatis, spiritus ætheris nitrosi, Dover's powder, antimony.

**Disinfectants.** Agents which destroy and thereby remove the causes of infection. Some disinfectants are also germicides. Examples : chlorine, chloride of lime, potassium permanganate, charcoal, creosote.

**Diuretics.** Substances which act on the kidneys and cause an increased flow of urine. Examples : squills, turpentine, alcohol, salts of sodium, potassium, lithium, etc.

**Emetics.** Medicines which excite vomiting. Examples : apomorphine (when used hypodermically), ipecacuanha, zinc sulphate, copper sulphate, ammonium carbonate, antimony.

**Emollients.** Local agents which relax soft tissues, allay irritation, protect sensitive surfaces and relieve pain. Examples : warm poultices, bread and milk, mucilaginous drinks, such as barley-water and gruel, glycerin, palatable oils, collodion, etc.

**Errhines.** Substances which excite sneezing and produce an increased secretion from the nose. Examples : ammonia, ipecacuanha, chlorine, snuff, etc.

**Escharotics.** Powerful caustics which produce an eschar. The most common use of these agents in dentistry is in the application of arsenic to devitalise the pulp of a tooth (see Arsenic). Examples (see **Caustics**).

**Expectorants.** Medicinal agents which not only increase the amount of secretion in the air passages and lungs, but also modify its characters, whereby it

is more easily expectorated. Examples : ammonium carbonate, squills, aromatics, ipecacuanha, potassium iodide, benzoin, apomorphine (by the mouth).

**Febrifuges.** See **Antipyretics.**

**Germicides.** See **Antiseptics and Disinfectants.**

**Hæmatinics.** Medicines which increase the number of the red corpuscles and the amount of hæmatin of the blood. Examples : the different preparations of iron.

**Hæmostatics.** Substances which arrest both external and internal hæmorrhage. Examples : adrenalin, iron, ergot, alum, gallic and tannic acids, calcium chloride and matico.

**Hypnotics.** See **Narcotics.**

**Laxatives.** See **Cathartics.**

**Mummifying Agents.** Drugs which dry up and harden tissues. In dental practice they are used in two ways, one where the dental pulp is afterwards removed, the other where it is intended to leave the whole or part *in situ* (see page 255). Examples : tannic acid, copper sulphate, formalin, paraform, mercuric chloride, "Trio."

**Narcotics.** Medicines which act on the nervous system ; when they induce sleep they are called *Hypnotics* or *Soporifics*, if used to relieve pain they are called *Anodynes*. Patients very quickly become habituated to their use, therefore it will be found necessary to *gradually* increase the dose to maintain the first effect. Examples : opium and its preparations, chloral, sulphonal, potassium bromide, etc.

**Nervines.** Medicines which cure, relieve or alter diseases of the nervous system. Examples : quinine, phosphorus, arsenic, iron, etc.

**Obtundents.** Agents which deaden pain. In dentistry the term is applied to those drugs which relieve the pain of sensitive dentine. These are many in number and there are various and more or less modern methods of applying them. What might be called the old-fashioned remedies are such drugs as carbolic acid, zinc chloride, clove oil, cocaine, silver nitrate (for back teeth only), arsenic (for shallow cavities); whilst amongst the modern ones are the application of drugs by means of electrical diffusion (cataphoresis), the sub-mucous injection of drugs like novocain, alypin, etc., the injection of the dentine itself with a "high-pressure syringe" of cocaine, the application of a jet of ethyl chloride, and the use of paraform.

**Purgatives.** See **Cathartics**.

**Refrigerants.** Medicines which diminish fever and allay thirst. Examples: solution of ammonium acetate, sweet spirit of nitre, acetic acid, citric acid, potassium nitrate, water, etc.

**Rubefacients.** See **Counter-Irritants**.

**Sedatives.** Medicines which directly depress or have a soothing effect on different parts of the system. Examples: digitalis, aconite, potassium bromide, tartrated antimony, etc.

**Sialogogues.** Medicines which excite an increased flow of the saliva and buccal mucus. Examples: pelltory root, horse radish, calomel, tobacco, mercuric iodide, potassium iodide, etc.

**Soporifics.** See **Narcotics**.

**Stimulants.** Medicines capable of exciting the vital powers. Examples: alcohol, ammonia, ether, camphor, aromatics, etc.

**Stomachics.** Medicines which aid the functions of

the stomach. Examples: sodium bicarbonate, the dilute mineral acids, aromatic bitters, nux vomica, pepsin, etc.

**Styptics.** Local remedies for arresting hæmorrhage. For a detailed description as to how these should be applied as regards hæmorrhage after tooth extraction, see page 99.

They may conveniently be divided into two varieties, *mechanical* and *chemical*. The former act either as a plug, or by detaining the blood in their meshes, whilst the latter coagulate the blood and cause constriction of the surrounding tissues. Examples: (*mechanical*) lint, cotton-wool, spider's web, plaster of Paris; (*chemical*) adrenalin, iron, carbolic acid, tannic acid, silver nitrate, etc. Matico leaves act both ways. Ice is a physical styptic.

**Sudorifics.** See **Diaphoretics**.

**Tonics.** Medicines which give tone and vigour to various parts of the system. Those which act by interrupting periodical attacks of disease, such as neuralgia, are called antiperiodics. Examples: the preparations of iron, cod liver oil, quinine, arsenic, strychnine, ammonium chloride, etc.

**Vesicants.** See **Counter-Irritants**.

## THERAPEUTICS

THERE are many other ways of treating disease than with drugs, therefore it is advisable to consider first—

The objects of treatment,  
The indications for treatment,  
The methods of treatment.

(1) **The Objects** to be kept in view are as follows :

(a) To cure our patient as speedily and completely as possible. This is termed **curative** treatment. As a dental example : by extracting a buried root, which is causing an acute alveolar abscess, pain is at once relieved, and a cure effected.

(b) **Expectant** treatment. To guide the progress of a case towards a favourable termination when it is not directly curable. Example : an irritated or inflamed pulp ; by careful capping with suitable drugs the inflammation may be relieved and the pulp saved.

(c) The third object is to remove, or relieve symptoms. **Symptomatic and palliative** treatment. The first is not always advisable, as one would only be trying to cure the *effect* of a disease instead of treating the *cause* ; at the same time, in some cases it is impossible to find or remove the cause, and then the symptoms must be treated.

**Palliative** measures are in certain cases of great service. Take, for instance, a case of neuralgia due to

exostosis of several teeth. It would be of little or no good to give any drug to relieve the neuralgia, but by extracting a certain tooth in which the pain is located relief would be obtained for a time, although the disease existed in other teeth, which would ultimately have to be removed before a cure could be effected.

(d) The fourth object is to prevent disease—**preventive** or **prophylactic** treatment.

In general practice this is carried out, in a great measure, by attention to all hygienic conditions. It also includes attention to the general health of a patient, in order to obviate any tendency to disease ; to prevent a disease extending to another, as in ringworm, or to the same patient, as in purulent ophthalmia ; vaccination, to prevent smallpox ; the warding off of habitual attacks, such as gout, etc. In dental practice, **preventive** treatment is carried out in several ways. In the first place, by the strictest attention to the *hygiene* of the oral cavity, such as keeping the teeth clean by means of suitable tooth-powders and tooth brushes. As regards the former, they should be thoroughly pulverised—not gritty, and consist of alkaline substances with an antiseptic agent. The latter should have bristles of medium stiffness, not too hard, and be applied not so much with a to-and-fro motion, as is generally the case, but rather with an upward and downward action, accompanied with a rotary motion. They should be thoroughly cleansed after use and allowed to dry on an *open* receptacle, not a *closed* one. Approximal surfaces should be cleansed with floss silk, pieces of tape or strips of india-rubber.

Antiseptic mouth-washes are of great importance in keeping the oral cavity in a healthy state, and in many



cases they should be used, in addition to a tooth-powder, in preventing the formation of bacteria.

Then, again, the mouth and teeth are, as a rule, absolutely neglected in the sick room. This should not be so. Much harm is done to the teeth during a severe illness. It is in such cases that they require more attention than in health (see Listerine).

Teeth should be cleansed after every meal, or at least twice a day, more particularly at night.

Preventive treatment, as it affects the teeth, is also carried out by the judicious removal of certain teeth to prevent overcrowding; also in cases of incipient caries, where by carefully drilling out, not only a slight discoloration of enamel, but extending the cutting operation to a certain margin beyond what is actually seen, and properly filling, one makes sure of preventing any recurrence of caries round the edges of the cavity. Then in very deep fissures of the teeth, where there is no actual decay, it is often advisable to cut out a cavity and fill with some suitable stopping to prevent retention of food particles, which induce caries. When patients are taking any medicines such as the mineral acids they should always be advised to rinse out their mouth with plain or alkalised water, or to take the drug through a straw, to prevent injury to the teeth. Extra attention and cleanliness are also needed with patients who are undergoing mercurial treatment for syphilis.

(2) **The Indications for Treatment.** These depend on the nature and seat of disease, and on the symptoms present, which may not only call for the adoption of certain measures, but may contra-indicate a line of treatment which would otherwise be followed. Take, for instance, a case of a carious lower wisdom tooth,

the pain of which is frequently reflected to the bicuspid region. If due care be not taken to examine the wisdom tooth one of the bicuspid is treated, perhaps with extraction, and the pain remains. Again, our treatment varies when a pulp is exposed according to the cause and also as to its condition, whether it is inflamed, ulcerated, or only simply exposed.

In the administration of anasthetics the choice of chloroform, ether or the A.C.E. mixture will in a great measure depend on the state of the heart or the lungs and the age of the patient. Ether is dangerous by gas-light or when the actual cautery has to be used, also in people suffering from bronchitis.

(3) **The Methods of Treatment.** (a) By means of drugs given internally. (b) By the use of local and external applications and electricity. (c) By attention to diet and general hygiene. (d) By operations.

#### ROUTES BY WHICH MEDICINES ENTER THE CIRCULATION

Medicines enter the circulation when they are either applied **externally** or administered **internally**.

- |              |   |                                    |
|--------------|---|------------------------------------|
| I. External  | { | 1. The en-epidermic method.        |
|              |   | 2. The epidermic           ,,      |
|              |   | 3. The endermic           ,,       |
|              |   | 4. The hypodermic       ,,         |
|              |   | 5. To serous cavities.             |
|              |   | 6. To wounds and diseased surfaces |
|              |   | 7. By cataphoresis.                |
|              |   | 8. Serum treatment.                |
| II. Internal | { | 1. By inhalation.                  |
|              |   | 2. By the mouth.                   |
|              |   | 3. By the rectum.                  |



**I. Externally.** (1) *The en-epidermic* method consists of the application of plasters, blisters, poultices, lotions, etc., to the skin.

(2) *The epidermic*, or method by inunction, is the application of drugs to the skin, aided by friction.

(3) *The endermic* method consists first in the application of a blister which raises the cuticle, opening the bleb, allowing the serum to escape, and applying a drug to the raw surface. This process, however, is not only slow, but is very painful, and if applied to the face would be disfiguring. It is now almost entirely superseded by the following :

(4) *The hypodermic* method. This is a favourable method of introducing drugs into the system. A graduated syringe is required, and the following directions must be carried out. Pick up a fold of loose skin between the thumb and forefinger, push the point of the needle right through the skin till its point works easily in the tissues beneath. Then inject slowly, and when withdrawing, press firmly with the finger and keep it over the puncture for a minute to prevent the fluid escaping. A few conditions are necessary for the success of the operation, viz. :—(1) the fluid to be injected must be small in bulk and unirritating to the part ; (2) care must be taken not to puncture a vein, also not to introduce the needle too deeply and not at the same point on subsequent injections.

The effects of a drug are more rapidly obtained by this method than when administered internally. When morphine or any anodyne is used in painful cases the relief obtained is, as a rule, so great that the patient will beg and entreat for more on return of the pain. It is therefore necessary not to resort to this form of

remedies unless absolutely obliged, as the dose (which should always be small at first) will have to be gradually increased in order to have the desired effect. This method is occasionally used for the relief of neuralgia (see Morphine), also for the administration of ergotin in cases of alveolar hæmorrhage (see Ergot). Aseptic hypodermic injections are now rendered comparatively easy by means of "tabloids," "tablets," "ampoules," etc., but in all cases *complete* sterilisation of the part to be injected and the instruments to be used must be carried out. The term "hypodermic" injection as applied to the extraction of teeth is misnamed. It should be "sub-mucous," and for a detailed account of this see page 249.

(5) *To serous cavities.* Drugs are frequently applied to serous cavities, not only for antiseptic purposes, but also as "irritants," to set up adhesive inflammation. This is seen in cases of ranula (see Iodine, p. 96).

(6) *To wounds and diseased surfaces.* This applies to those cases where poultices, lotions, or ointments are applied to ulcers, gargles to the mouth, injections into the nose and antrum.

(7) *By Cataphoresis (Electrical Diffusion, Electrical Osmosis).* The introduction of drugs into the system through the skin or mucous membrane by means of solutions of drugs applied by the electrode of a battery. In dentistry this method is sometimes used in the treatment of pyorrhœa alveolaris, for devitalising pulps, for bleaching discoloured teeth, and for obtunding sensitive dentine, etc.

(8) *Serum treatment.* See Bacterio Therapeutics, p. 261.

**II. Internally.** (1) *By inhalation.* By this method drugs enter the system in a greater state of purity than

by any other. It is used in throat and lung disease and for the administration of anæsthetics.

(2) *By the mouth.* This is the most useful and convenient method of administering drugs, but has a few disadvantages, such as the patient tasting the drug, which unless disguised with some flavouring agent or is in the form of a pill, capsule or cachet is often nauseous, or from its interference with the function of digestion, or, on the other hand, the process of digestion preventing its proper absorption.

(3) *By the rectum.* It is sometimes inadvisable to administer medicines or food by the mouth, and they are given *per rectum* in the form of enemata, of which there are three kinds: purgative, absorptive and nutritive.

(a) *Purgative.* For easy and efficient evacuation of the large bowel no method can compare with this. Sometimes an injection of warm water alone will be sufficient for this purpose, or soap and water, thin gruel, or castor oil may be used. Whether a simple enema is required, or one with castor oil, aloes, etc., the quantity of the injection should be made up to about twelve ounces or one pint. Purgative enemata act not only mechanically by washing out the bowel, but they also stimulate its action.

(b) *Absorptive.* These substances, as their name implies, are intended to be absorbed, and therefore should not be of large bulk (about one to two ounces), or they will excite the expulsive action of the bowel.

(c) *Nutritive.* These preparations are used in cancer and stricture of the œsophagus, ulcer of the stomach, etc., where the patient either cannot swallow, or vomiting is excited by the entrance of food into the

stomach. The articles generally used are beef-tea, eggs, milk, brandy, etc., and these are often mixed with pepsin or pancreatin to aid their digestion.

In addition there are *anthelmintic* enemata which expel worms, *antipyretic* enemata to reduce temperature, and *styptic* enemata to arrest hæmorrhage.

Where the different forms of injections cannot be retained, suppositories may be used instead.

#### SOME OF THE FORMS IN WHICH MEDICINAL SUBSTANCES ARE EMPLOYED

**Alkaloids.** Are the active principles of drugs. Their distinctive mark as regards nomenclature is the termination "ine."

**Cachets, Capsules, and Chocellæ.** These are agreeable forms of administering nauseous drugs, the former being made of wafer-paper of various sizes in the shape of watch-glasses, which cohere on moistening their margins. They should be dipped in water immediately before swallowing. The latter are short tubes made of gelatin, and choecellæ are a pleasant form of taking drugs.

**Cataplasms.** Are soft macerated preparations applied externally.

**Collunaria.** Fluids used as nasal douches.

**Collyria.** Fluids used as eye-washes.

**Decoctions.** Are solutions made by boiling vegetable substances in water.

**Dentifrices.** Are mixtures of powders and other substances used for cleaning teeth. They should always consist of antiseptic and alkaline substances in addition to other ingredients, and too much care cannot be taken in mixing them properly in order to get a smooth

powder. This is best obtained by passing them through a fine sieve.

**Emulsions.** Preparations which contain substances that are sparingly soluble in water, such as oils and resins, and are suspended in mucilage, yolk of egg, etc.

**Enemata.** Liquid preparations for injection *per rectum* (see page 39).

**Extracts.** Preparations obtained by evaporating either the expressed juice of fresh plants or the soluble constituents of dried drugs.

**Fomentations.** Preparations applied to different parts of the body by means of a sponge, flannel or soft cloth wrung out in hot water.

**Gargles.** Liquid preparations for washing the mouth and throat. In the author's opinion these should be called "mouth-washes," as in the large majority of cases, when they are used to gargle the throat, the drug or drugs seldom get beyond the anterior pillars of the fauces. It is much better to use a throat brush, insufflation, or an inhalation, when a drug is required to act on any part beyond these structures.

**Glycerins.** Are solutions of medicinal substances in glycerin. The official glycerins are—

Glycerinum Acidi Borici.

„	„ carbolic.
„	„ tannici.
„	aluminis.
„	amyli.
„	boracis.
„	pepsini.
„	plumbi subacetatis.
„	tragacanthæ.

**Infusions.** Are preparations obtained by pouring hot or cold water upon vegetable substances for the purpose of extracting their medicinal properties. Those which contain more than one active ingredient are called compound infusions.

**Inhalations.** Preparations employed for their local effect on the mouth, nose, throat and chest. They are often useful in producing the constitutional effects of a drug.

**Insufflations.** Are the application of various levigated substances to the nasal cavities, throat, ear and open surfaces by means of an insufflator.

**Lamellæ.** Discs of gelatin with some glycerin containing a drug.

**Liniments.** Liquid preparations applied externally by means of friction. One exception is the iodine liniment which, unless united with some oily substance, is best used as a "paint," otherwise vesication will occur.

**Liquors.** Solutions of vegetable principles or inorganic substances in distilled water or weak spirit.

**Lozenges.** Are dried tablets of refined sugar and gum acacia, with one or more active ingredients.

**Mella.** Preparations of honey.

**Mixtures.** Are fluid preparations containing several ingredients administered by the mouth.

**Mouth-Washes.** Are liquid preparations for use in the oral cavity. They are, as a rule, of an antiseptic character and contain, in addition, either an astringent, a sedative or a demulcent, according to the state of the mouth.

**Mucilages.** Are watery solutions or mixtures containing gum.



**Ointments.** Preparations for local use, which are composed of wax, lard, lanolin, or resin, with solid or liquid ingredients.

**Pills.** Are masses of medicinal agents of a spherical or globular shape. They vary very much in size and are usually coated to aid their deglutition.

**Plasters.** Are applications spread on cloth or leather, which, at the ordinary temperature of the body, adhere to the part to which they are applied.

**Powders.** Are dry substances in minute particles. When of a nauseous nature they should be given in cachets or capsules.

**Spirits.** Are for the most part alcoholic solutions of a volatile oil. Some are prepared in a special manner, and are then called *complex spirits*.

**Stearoptenes.** Are the solid constituents of volatile oils.

**Syrups.** Fluid preparations containing a large amount of sugar.

**Tabloids and Tablets.** Are small flat preparations made from drugs and sugar of milk which have been minutely subdivided, admixed and compressed.

**Tinctures.** Are solutions of active substances in rectified or proof spirit.

**Wines.** Are solutions of drugs in sherry or orange wine.





# INORGANIC SUBSTANCES



# INORGANIC SUBSTANCES

## ACIDUM ACETICUM

### ACETIC ACID

**Formula.**  $\text{CH}_3\text{COOH}$ .

**Source.** It is prepared from wood by destructive distillation and purification.

**Characters.** A colourless liquid with a pungent odour and strong acid reaction; sp. gr. 1.044. It occurs in three grades of strength. The *glacial acetic acid*, which is three times as strong as the ordinary acid, and this latter is eight times stronger than the dilute acetic acid. Vinegar is an impure form of the latter, derived from alcohol.

**Pharmacology.** It is a counter-irritant, diuretic, stimulant, refrigerant, vesicant and caustic.

**General and Oral Therapeutics.** Used externally to destroy corns and warts. As a refrigerant a very dilute solution sponged on the skin in cases of fever will frequently reduce the temperature. May be given as an antidote to poisoning by alkalies.

*As a local stimulant.* In cases of cancrum oris and ulcers of the mouth the application of dilute acetic acid with a camel's-hair brush is at times of great service. As a mouth-wash for inflamed

conditions of the mouth and fauces the following prescription is most useful :

Acetic acid . . . . .	2 drachms.
Ammonium chloride . . . . .	3 „
Honey . . . . .	1½ ounces.
Water to . . . . .	12 „

To be used frequently as a mouth-wash.

*As a caustic.* It is applied in the form of glacial acetic acid to fungoid growths of the gum and pulp.

*As a cleansing and neutralising agent.* See Sodium dioxide, page 118.

**Dose.** Of the dilute acid  $\frac{1}{2}$  fl. dr. to 2 fl. drs.

**Symptoms of Poisoning.** Odour in the breath, pain in abdomen, collapse, death.

**Antidotes.** Large doses of soap and water, lime-water, and magnesia. The stomach-pump should *not* be used.

## ACIDUM ARSENIOSUM

### ARSENIOUS ANHYDRIDE

**Formula.**  $\text{As}_4\text{O}_6$ .

**Synonyms.** White arsenic, arsenious acid.

**Source.** It is obtained by roasting arsenical ores and purifying by sublimation.

**Characters.** It is seen either in the form of a heavy white powder or in porcelain-like masses stratified in appearance, according to the different opacity of its layers. It has no odour, scarcely any taste, but merely a faint sweetish impression, and is therefore liable to be mistaken for some more innocent substance. When heated it has the odour of garlic.

**Preparations.** Liquor arsenicalis (“Fowler’s Solution”). Liquor arsenici hydrochloricus.

**Pharmacology.** It is an alterative, antiperiodic, antiseptic, caustic, devitalising agent, escharotic, irritant, tonic and obtundent of sensitive dentine (shallow cavities only). The continued application of a strong arsenical compound has a *destructive* effect which is not simply a chemical one like that of acids and is not exerted on the dead subject, but is produced by interference with the nutritive processes of the parts to which it is applied, causing a condensation and mummifying of tissue rather than an actual destruction. From its great antiseptic powers it is used in the dissecting room for injecting bodies.

It is fatal to many of the lower forms of animal life, but does not check fermentation (Murrell).

Its action on the dental pulp is to cause hyperæmia, followed by dilatation of the blood-vessels, which have a tendency to thrombosis, and this eventually leads to gangrene of the pulp. Neither the connective-tissue fibres nor the odontoblasts are changed, but the connective-tissue cells increase in size and the axis cylinder of the nerve elements here and there disappears. Being a crystalloid, it is liable to permeate the dentine and cementum and pass into the collateral circulation and so set up periostitis, with death of the peridental membrane and even necrosis, not only of the alveolus, but of the neighbouring teeth. Pressure anæsthesia has to a very great extent superseded the use of arsenic for devitalisation and extirpation of the pulp.

**General Therapeutics.** *Externally* it is used for various skin diseases, and as an application to cancers. *Internally* it is given in cases of chorea, diabetes, ague, dyspepsia, rheumatism and neuralgia, particularly in those who have been subject to ague.

**Dental Therapeutics.** Arsenic is used by dentists for three purposes :

- (1st) To destroy the pulps of teeth ;
- (2nd) As an obtundent of sensitive dentine ;
- (3rd) As an alterative.

*As a devitalising agent.* When using arsenic for this purpose, several precautions are necessary, and very careful manipulation is needed to ensure success. The following directions should be observed :

(a) Apply the rubber dam. This not only keeps the cavity dry, but prevents the arsenic from coming in contact with the gum, an event which would cause sloughing of that tissue, even if more serious effects did not occur.

(b) Carefully dry the cavity with cotton-wool or bibulous paper, and afterwards (if the patient can bear it) with a hot-air syringe, and remove all softened dentine.

(c) If the exposure be small, enlarge it with a *sharp* excavator, as arsenic applied to a small exposure acts as an irritant, produces severe inflammation (or increases that which already exists) and causes excruciating pain on account of the pulp squeezing through the small opening and becoming constricted.

(d) Apply the arsenic (about  $\frac{1}{16}$  gr.) mixed with an equal quantity of either novocain or alypin on a piece of cotton-wool or cardboard, which has previously been dipped in clove oil or eucalyptus, to the exposure. This should be capped with a metal cap to prevent pressure, and the cavity filled with temporary gutta-percha or hard beeswax, or, if on a masticating surface, with calxine. A solution of gum mastich or gum sandarac should never be used as a temporary filling

on the top of arsenic, as it is not only liable to get under the cap and prevent its action, but the dressing might partially come away when taking off the rubber dam, and in addition to this it is not a safe filling. Plaster of Paris and wax are sometimes used to retain the arsenic in position, but the two first-mentioned materials are best. Should the cavity extend to or below the gum margin, place a rim of gutta-percha along the cervical margin first. This will allow the arsenic to be applied without shifting when the temporary stopping is inserted.

Elastic caps are made to keep temporary fillings *in situ* in cavities of isolated teeth where there is danger of their not being retained.

In addition to the powdered arsenic by itself being used there are different preparations, such as Baldoek's nerve paste, arsenical nerve fibre, etc., which have (or should have) the same effect. The latter consists of arsenic, creosote, tannic acid and morphine acetate incorporated in fibre. The application should be left in from twenty-four to forty-eight hours. It is always advisable to tell patients there will be more or less pain after the application: with the nerve fibre generally less, but it can be left in for a longer time, which is sometimes an advantage, as the patient may live some distance away and not be able to attend again for some days.

(e) When using clove oil, eucalyptus or any other fluid as a means of taking up the arsenic, an excess should not be used, as it is liable to be squeezed out, and with it some of the arsenic.

(f) It should not be used in young children unless the root of the tooth is fully formed, as in destroy-

ing the pulp of a growing tooth its growth is stopped.

(g) Should a pulp be acutely inflamed, apply first of all the following mixture to relieve the pain before using the arsenic :

Acetate of morphine	.	.	20 grains.
Tannic acid	.	.	30 „
Creosote	.	.	2 drachms.

Mix. Apply on a pellet of cotton-wool and seal in for twenty-four hours. A far more favourable plan, however, is to apply alypin or novocain first before the arsenic.

(h) Do not use it in excess, as the effects spread to periosteum, bone and neighbouring pulps and so cause their destruction.

A devitalising paste is generally made up as follows ;

Arsenious acid	.	.	10 grains.
Acetate of morphine	.	.	10 „
Creosote	.	.	sufficient quantity to make a paste.

Occasionally it will be found that several applications of arsenic will fail to produce devitalisation, and the resistance offered to the influence of the drug be due to the following causes :

(1) There may be a protective covering of granulating tissue which has formed over the surface of the exposed portion, defending it from the action of the arsenic.

(2) There may be an extraordinary vital power or tolerance in the pulp of a patient who probably would not be so susceptible to the action of arsenic when administered by the mouth as the majority of people are. In such cases the difficulty is overcome either by



first applying novocain and scraping off the granulated surface (if present), or pricking the pulp with a sharp instrument which has previously been dipped in arsenic, or administering an anæsthetic and clearing out the contents of pulp cavity and canals with a burr on the dental engine, or trying pressure anæsthesia.

(3) It may be due to the fact that the exposure was not big enough or that the arsenic was pushed off the exposure by the subsequent temporary stopping.

(4) The presence of pulp stones.

(5) The formation of secondary dentine.

After its application it will frequently be found that a small portion of the pulp at the end of a canal is still alive. In such cases the application for a few days of a carbolic acid solution in alcohol (1 : 20) will complete the action of the arsenic.

It is sometimes advisable to put in a dressing of tannic acid for a few days after devitalising. This will harden the pulp and facilitate its removal. Arsenic should not be used when it has been known to have caused bad pain previously or where it cannot be properly sealed in, or when the patient cannot be seen for some time.

*As an obtundent.* It allays the pain of sensitive dentine, but should only be used in very *shallow* cavities, as it is capable of penetrating through a considerable thickness of dentine, the result of which would be death of the pulp. If ever used for this purpose it should only be allowed to remain in the cavity (which must be thoroughly sealed up) about two or three hours, and then every particle carefully removed. Other obtundents are preferable.

*As an alterative and antiperiodic.* Given internally

it frequently relieves neuralgia where quinine has failed. When given for this or any other complaint it should always be taken directly *after* meals, for if taken on an empty stomach it may act as an irritant poison.

**Doses.**  $\frac{1}{60}$  to  $\frac{1}{5}$  grain. Of both solutions 2 to 8 minims.

**Symptoms of Poisoning.** Faintness, depression, burning pain in stomach, nausea, vomiting, purging, cramp, thirst, skin cold, collapse.

**Antidotes.** Moist peroxide of iron (freshly prepared), animal charcoal, emetics, stomach-tube, stimulants and artificial respiration.

## ACIDUM BORICUM

### BORIC ACID

**Formula.**  $H_3BO_3$ .

**Synonyms.** Boracic acid, hydrogen borate.

**Source.** It is made by the action of sulphuric acid on borax.

**Characters.** Colourless pearly plates, without odour, and of a slightly bitter taste.

**Preparations.** Glycerinum acidi borici, unguentum acidi borici, boroglyceride (non-official).

**Pharmacology.** It is a mild antiseptic, germicide, bleaching agent and preservative. As a surgical dressing it is most valuable, as it produces little if any irritation to the parts to which it is applied, lessens suppuration and prevents decomposition.

**General Therapeutics.** It is greatly used as a surgical dressing for burns, wounds, and ulcers.

**Dental Therapeutics.** *As an antiseptic.* It is employed as a mouth-wash in cases of the different ulcerations

of the oral cavity and necrosis of the jaws, in the strength of 20 grains to 1 ounce of water. In the latter case, if the patient is unable to open the mouth, the cavity should be well syringed with the solution, and the same applies to cases of fracture. It is also used as an ingredient of dentifrices.

*As a bleaching agent.* In combination with sodium sulphite it is used for bleaching dead teeth, the mixture being composed of ten parts of sulphite of soda to seven of boric acid, which should be thoroughly ground together in a warm dry mortar to a fine powder, preserved in an airtight stoppered bottle and kept in a dry place (Dr. E. C. Kirk). In using this, the rubber dam must be applied and the apical foramen closed, and half the length of the root filled with gutta-percha. Then pack the powder into the cavity and allow just one drop of water from a drop tube to fall upon it, and seal with gutta-percha. The action of the water is to liberate sulphur dioxide, which is a powerful bleaching agent. It should remain in the cavity two or three days and two, if not three, applications are necessary.

**Dose.** 5 to 15 grains.

## ACIDUM CHROMICUM

### CHROMIC ACID

**Formula.**  $\text{CrO}_3$ .

**Synonym.** Chromic anhydride.

**Source.** Made from potassium bichromate by the action of sulphuric acid and water.

**Characters.** It occurs in the form of crimson needles, which are very deliquescent, inodorous, corrosive and soluble in water. If mixed with glycerin or alcohol

an explosion may occur, therefore these substances should be added drop by drop when combined.

**Pharmacology.** It is an escharotic, obtundent, deodorant and disinfectant. Great care must be taken to limit its action to the diseased parts on account of its power of penetrating tissues.

**General and Oral Therapeutics.** Employed chiefly for its escharotic properties. For psoriasis and syphilitic affections of the tongue a solution of the strength of 1 in 40 is most serviceable for relieving the pain of passing food, which must in such cases be of a simple nature and condiments and all irritating substances avoided. It should be painted over the affected parts with a camel's-hair brush before meals.

*As an escharotic.* It is frequently applied, and with success, to small growths on the gum, warts on the tongue and fungoid growths of the pulp. The strength to be used is one of the acid to four of water, the parts around being carefully protected with strips of adhesive plaster, and a glass rod or a wire of gold or platinum used for its application.

*As an obtundent.* It can be used for the relief of sensitive dentine, but is in no way superior to novocain, zinc chloride or carbolic acid.

**Other Dental Uses.** It is used in dental microscopy as a *fixing* and *hardening* reagent, in various strengths for decalcifying hard tissues, and as a  $\frac{1}{8}$  per cent. solution as a staining reagent for showing the peripheral nerves in a fresh pulp.

**Dose.** It is not given internally.

**Antidotes.** Emetics, chalk and milk, stomach-tube and demulcent drinks.

## ACIDUM HYDROCHLORICUM

## HYDROCHLORIC ACID

**Formula.** HCl.

**Synonyms.** Muriatic acid, "spirits of salt."

**Source.** Obtained by the action of sulphuric acid upon sodium chloride and solution of the gas or fumes in water.

**Characters.** When pure it is a transparent colourless fluid, when impure it has a yellow colour. It emits a dense white vapour with a pungent odour and corrosive taste. Sp. gr. 1.16.

**Preparation.** Acidum hydrochloricum dilutum.

**Pharmacology.** Applied externally, the strong acid is a powerful caustic and escharotic. It does not penetrate so deeply as nitric and sulphuric acids, but produces a white stain, and this part afterwards sloughs.

Internally it is refrigerant, tonic and astringent in its action. In moderate doses the dilute acid has two main effects. (1) It augments the acidity of the gastric juice, and so improves its digestive power; (2) after absorption it gives rise to extra formation of sodium chloride.

**General and Oral Therapeutics.** It is given in cases of atonic dyspepsia, most of the fevers, etc., and is applied locally in the various diseases of the throat, such as diphtheria and ulcerated sore throat.

*As a local agent.* Dilute hydrochloric acid combined with equal parts of glycerin is useful in inflammation and ulceration of the mucous membrane of the mouth, and when applied to any sloughing parts will arrest the necrotic changes and

induce healthy inflammation. In mercurial stomatitis the following prescription can be used with advantage as a mouth-wash :

Dilute hydrochloric acid	.	.	1 ounce.
Potassium chlorate	.	.	2 drachms.
Glycerin	.	.	1 ounce.
Rose-water to	.	.	12 ounces.

To be used as a mouth-wash.

When being taken internally for any length of time it should be sucked through a straw, or plain or alkalised water should be used immediately afterwards to rinse the mouth out to prevent the acid injuring the enamel of the teeth.

**Other Dental Uses.** It is used as a " pickle " for gold and platinum, zinc and borax being dissolved by it, and as a decalcifying agent in dental microscopy in the strength of a 10 per cent. solution.

**Dose.** Of the dilute acid, 5 to 20 minims.

For **Symptoms of Poisoning** and **Antidotes**, see page 63.

## ACIDUM NITRICUM

### NITRIC ACID

**Formula.**  $\text{HNO}_3$ .

**Synonym.** Aqua fortis.

**Source.** Obtained by the action of sulphuric acid on potassium or sodium nitrate.

**Characters.** When pure it is a colourless, intensely acid, fuming liquid. Sp. gr. 1.42.

**Preparations.** Acidum nitricum dilutum, acidum nitro-hydrochloricum dilutum.

**Pharmacology.** It is a powerful caustic and escharotic



and leaves a permanent stain on the skin. It is also an alterative, tonic and refrigerant, and if its administration is prolonged it causes salivation.

**General and Oral Therapeutics.** Externally the strong acid is used in hospital gangrene, phagedenic ulcerations, syphilitic sore throat and malignant ulcers. Internally it is given in the dilute form for dyspepsia, in the different fevers and hepatic disorders. The same precautions as with HCl must be taken when prescribing this drug to avoid injury to the teeth.

*As a caustic.* It is employed in cases of cancrum oris and malignant ulcers of the mouth, the constitution at the same time being supported by the internal administration of quinine, acids, port wine and generous diet.

*As a devitalising agent.* It has also been used to destroy the pulps of teeth, but such a method is to be deprecated, as it will not only cause disintegration of the dentine, but its use for this purpose is at once brutal and unscientific.

**Other Dental Uses.** When three parts of strong nitric acid are mixed with four parts of strong hydrochloric acid, aqua regia is formed. This dissolves gold. A 1 per cent. solution of the acid is used as a decalcifying agent in dental microscopy.

**Doses.** Acidum nitricum dilutum, acidum nitrohydrochloricum dilutum, 5 to 20 minims.

For **Symptoms of Poisoning** and **Antidotes**, see page 63.

## ACIDUM PHOSPHORICUM CONCENTRATUM

## CONCENTRATED PHOSPHORIC ACID

**Formula.**  $\text{H}_3\text{PO}_4$ .

**Source.** Made by boiling phosphorus with nitric acid and water, evaporating till coloured vapours cease and diluting with water.

**Characters.** A colourless syrupy liquid with a sour, yet not unpleasant taste.

**Preparation.** Acidum phosphoricum dilutum.

**Pharmacology.** The dilute acid is a nervine tonic and refrigerant. In large doses it is an irritant poison.

**General Therapeutics.** It is employed as a local application in cases of caries and necrosis of bones. Given internally in scrofula and to allay the thirst of diabetes and fevers.

**Dental Therapeutics.** The concentrated acid is the chief constituent of the liquid portion of the oxyphosphate and silicate fillings, but it is sometimes combined with phosphate of alumina.

It will occasionally relieve the pain of sensitive dentine.

**Dose.** Of the dilute acid, 5 to 20 minims.

## ACIDUM SULPHURICUM

## SULPHURIC ACID

**Formula.**  $\text{H}_2\text{SO}_4$ .

**Synonym.** Oil of vitriol.

**Source.** Obtained by the combustion of sulphur, the oxidation by nitrous fumes, and hydration by aqueous vapour of the resulting sulphurous acid gas.



**Characters.** It is a dense, oily, colourless liquid, with a pungent odour and a corrosive action. Sp. gr. 1·843.

**Preparations.** Acidum sulphuricum dilutum, acidum sulphuricum aromaticum.

**Pharmacology.** It is a caustic, escharotic, internal astringent, tonic, refrigerant and solvent of bone.

**General and Dental Therapeutics.** Externally it is used for caries and necrosis of bone. In these cases the patient's constitution is undermined by the discharge which takes place during the time of the separation of the dead from the living bone. The local application of equal parts of sulphuric acid and water, however, causes a more speedy removal of dying bone or more rapid separation of dead portions, and in cases of caries a quicker destruction of carious particles.

Internally it is used in cases of hæmorrhage of a passive character, combined with gallic acid (see Gallic Acid); also in diarrhœa and in lead poisoning when it is combined with magnesium sulphate.

*As a caustic.* The strong acid is employed in cases of malignant ulcers, cancrum oris and gangrene, in the form of a paste made by mixing it with powdered zinc sulphate in the following proportions :

Zinc sulphate . . . . .  $\frac{1}{2}$  ounce.

Sulphuric acid, sufficient quantity to make a paste.

*As a hæmostatic.* It is useful in alveolar hæmorrhage combined with ergot (see Ergot).

*In root treatment.* To assist in opening up fine or obstructed pulp canals its use is recommended by twisting up some asbestos fibre (not cotton-wool) on a bristle and applying a 50 per cent. solution.

**Other Dental Uses.** It is used to cleanse metal plates preparatory to and after soldering, for which purpose it is generally diluted with a little water (about  $\frac{1}{3}$ ), its action being greater when it is "boiled up." When diluting it pour the acid *slowly* into the water, not the reverse, as it is dangerous. In combination with nitric acid it is used to reduce hemp paper to pyroxylin in the manufacture of celluloid.

**Dose.** Of the dilute acid, 5 to 20 minims.

For **Symptoms of Poisoning** and **Antidotes**, see page 63.

## ACIDUM SULPHURICUM AROMATICUM

### AROMATIC SULPHURIC ACID

This preparation should really be described under the heading of "Acidum Sulphuricum," but as it is of important use to the dental surgeon it was thought best to emphasise it by a separate description.

**Synonym.** Elixir of vitriol.

**Source.** It is prepared by mixing 3 ounces of sulphuric acid gradually with  $29\frac{1}{2}$  ounces of alcohol (90 per cent.),  $1\frac{1}{2}$  ounces of spirit of cinnamon, and 10 ounces of tincture of ginger.

**Characters.** It is a reddish-brown liquid, with an aromatic odour. Sp. gr. 0.922 to 0.926.

**Pharmacology.** It is a tonic, astringent, local stimulant and solvent of bone.

**Dental Therapeutics.** *As a solvent.* Its chief use is for the treatment of pyorrhœa alveolaris. In these cases, even after very careful scaling, small particles of tartar are left on the roots of the teeth, and in addi-

tion to this the alveolar borders are often in a carious condition and the gums in a chronic state of inflammation. All these conditions can be improved, if not cured, by using the following prescription :

Aromatic sulphuric acid	.	.	3 drachms.
Tincture of capsicum	.	.	10 drops.
Water	.	.	2 drachms.

Place a little of this on a small pledget of cotton-wool in the pockets between the gum and teeth, and allow it to remain there for about half an hour, when it should be removed and the parts syringed with warm water. The tincture of capsicum stimulates the gum to healthy action. This mode of treatment should always be assisted with antiseptic methods.

**Dose.** 5 to 20 minims, freely diluted.

**Symptoms of Poisoning of the Mineral Acids.** Burning pain in throat, gullet and stomach. Retching, vomiting. Excoriation of the mouth. Difficulty in speaking, swallowing and breathing. Pulse small. Collapse.

**Antidotes.** Soap and water, chalk, magnesia (Dinncord's is the best), sodium or potassium bicarbonate—in fact, any alkali. Milk; hypodermic injection of morphine to ward off shock. If larynx is involved, tracheotomy may be necessary. The stomach-tube must *not* be used.

## ALUMEN

### ALUM

**Formula.**  $\text{Al}_2\text{SO}_4, \text{K}_2\text{SO}_4, 24\text{H}_2\text{O}$  (potassium alum),  
or  $\text{Al}_2\text{SO}_4, (\text{NH}_4)_2\text{SO}_4, 24\text{H}_2\text{O}$  (ammonium alum).

**Source.** Made by the combination of aluminium

sulphate with potassium sulphate, or with ammonium sulphate.

**Characters.** Colourless octahedral crystals, or irregular lumps, which have an acid, sweetish, astringent taste. Soluble in 1 in 10 cold, 10 in 8 boiling water, 1 in 4 in glycerin. When heated it dissolves in its water of crystallisation, and when this has been driven off alum remains as a dry white spongy mass (*alumen exsiccatum*), dried alum.

**Preparation.** Glycerinum aluminis.

**Pharmacology.** It is an astringent, styptic, sialogogue and in large doses an emetic. The dried alum is also a caustic. When taken into the mouth it causes dryness of all the parts and an abundant flow of saliva, coagulating the albumen of this fluid and the buccal mucus in white membranous flakes.

**General and Dental Therapeutics.** Used externally for arresting hæmorrhage and chronic inflammatory discharges from mucous membranes. Internally it is given for diarrhœa, chronic dysentery and, in large doses, for constipation and lead colic.

*As an astringent and styptic.* It is used to arrest alveolar hæmorrhage after tooth extraction, but is inferior to adrenalin, iron and tannin. In simple stomatitis, congested conditions of the mouth and sponginess of the gums, alum mouth-washes in the strength of from 5 to 10 grains to 1 ounce of water afford great relief.

After the extraction of many teeth or roots alum mouth-washes will considerably help to "harden" the gums. A simple prescription in such cases is one teaspoonful of powdered alum in a tumbler of water. Alum should not be used as an ingredient of dentifrices on account of the sulphuric acid it contains.

**Other Dental Uses.** For “dipping” models. The model should be first dried and then boiled in a strong solution for half an hour. It is also used to hasten the setting of plaster, and as a “pickle.”

**Dose.** 5 to 10 grains.

## AMMONIUM COMPOUNDS

The compounds of ammonium are very numerous. Those used in dentistry are the carbonate, ehloride, and valerianate.

### AMMONII CARBONAS

#### AMMONIUM CARBONATE

**Formula.**  $\text{N}_3\text{H}_{11}\text{C}_2\text{O}_5$ .

**Synonym.** Ammoniaë sesquicarbonas.

**Source.** It is obtained by subliming a mixture of ammonium ehloride and chalk.

**Characters.** White transparent crystalline masses with a pungent odour. When exposed to the air it loses its odour and erumbles into an opaque mass of ammonium bicarbonate.

**Pharmacology.** The vapour of ammonium earbonate (commonly ealled “smelling salts”) is stimulant and slightly irritant.

It is an antaeid, emetic (by virtue of its reflex action on the vomiting centre), diaphoretic and stimulant expectorant. It quickens the heart’s action and capillary eirculation, which is more marked in the weak than the healthy.

**General and Oral Therapeutics.** Externally it is used as a volatile or smelling salts in syncope, hysteria, and

asphyxia. Internally for chronic bronchitis, pneumonia, asthma, etc.

*As a stimulant.* Given internally in cases of cancrum oris, in doses of 5 grains, gradually increased to 10, every two or three hours, during the use of nitric acid as a local application. In these cases it is best combined with bark in the following proportions :

Carbonate of ammonium . . .	60 grains.
Spirits of chloroform . . .	2 drachms.
Decoction of cinchona to . . .	6 ounces.

Two tablespoonfuls to be taken every three hours.

**Dose.** 3 to 10 grains, or more ; as an emetic, 30 grains, well diluted.

## SPIRITUS AMMONIÆ AROMATICUS

### AROMATIC SPIRITS OF AMMONIA

**Synonym.** Sal volatile.

**Source.** Made from ammonium carbonate and a strong solution of ammonia, with oil of nutmeg, oil of lemon, rectified spirit and water.

**Pharmacology.** It is one of the most diffusible stimulants known and is a safer restorative than alcohol. It is also an antacid and carminative.

**General and Dental Therapeutics.** Given for syncope after operations. It counteracts the depressing effects of potassium iodide and bromide when these drugs are administered, and where the use of alcohol as a stimulant is prohibited.

It acts as an antacid when applied to the necks of

sensitive teeth, erosion cavities, etc., and will frequently relieve pain in these cases.

**Dose.** 20 to 40 minims for repeated, 60 to 90 minims freely diluted for single, administration.

## AMMONII CHLORIDUM

### AMMONIUM CHLORIDE

**Formula.**  $\text{NH}_4\text{Cl}$ .

**Synonyms.** Sal ammoniac, muriate of ammonia.

**Source.** Prepared by neutralising hydrochloric acid with ammonia.

**Characters.** Colourless, inodorous crystals, with a saline taste. Solubility, 1 in 3 of water.

**Pharmacology.** It is an alterative, nervine stimulant, expectorant, diaphoretic and diuretic. In large doses it is an irritant poison.

**General and Oral Therapeutics.** It is employed in cases of chronic pharyngitis, otitis media, laryngitis and bronchitis in the form of a vapour to facilitate expectoration. Many forms of apparatus for its inhalation are on the market. In most of them the vapour is generated by the action of hydrochloric acid on ammonia.

*As an alterative.* Its great use is for the relief of neuralgia, and in such cases the following can be prescribed :

Chloride of ammonium	.	.	3 drachms.
Tincture of lemons	.	.	3 „
Spirit of chloroform	.	.	$1\frac{1}{2}$ „
Water to	.	.	6 ounces.



Order two tablespoonfuls to be taken every three hours. If relief is not obtained after four doses its use should be discontinued, as it is not likely to have any effect after this.

**Other Dental Uses.** Used in the workroom to restore zinc which has become deteriorated from long use, also as a flux for refining gold.

**Dose.** 5 to 20 grains. Liquid extract of liquorice disguises its nauseous taste.

## LIQUOR AMMONIÆ FORTIS

### STRONG SOLUTION OF AMMONIA

**Source.** Made by heating a mixture of ammonium chloride and slaked lime, and collecting the gaseous product in water.

**Characters.** It is a colourless liquid with a characteristic odour, and strong alkaline reaction. Sp. gr. 0.891.

**Pharmacology.** It is a powerful local stimulant, rubefacient and vesicant. When applied to the mucous membrane of the nose as an inhalation, care must be taken that the solution is not too strong, as cases of fatal bronchitis have been set up through an overpowering effect of this drug. It is three times as strong as the solution of ammonia—liquor ammoniæ.

**General and Dental Therapeutics.** Used *with care* as a restorative in cases of syncope from any cause. Locally applied it is an antidote in cases of venomous snake-bites. Vesication by it is better avoided. It should not be given internally.

**Antidotes.** It may be given in mistake for sal volatile,



in which case give vinegar, lemon-juice or acetic acid freely diluted, and demulcent drinks.

**Tinctura Valerianæ Ammoniata**, see page 276.

## AQUA

### W A T E R

**Formula.**  $H_2O$ .

**Description.** Pure natural water is a limpid, colourless liquid, free from taste or odour. When evaporated it should leave no residue.

**Aqua Destillata.** Distilled water.

**Source.** Prepared by distillation from good natural potable water. This should always be used for preparing medicines, but seldom is.

**Pharmacology.** The action of water *per se* depends upon the way in which it is used and its temperature. Externally applied it is, first of all, a cleansing agent, not only to the skin, but to wounds; it either raises or lowers the temperature of the body; it relieves inflammation; it is an anodyne and hæmostatic. Internally it is a diuretic and diaphoretic. Warm water is also an emetic. Ice acts as a local anæsthetic.

**General and Dental Therapeutics.** For the relief of inflammation it is applied in the form of hot fomentations, either alone or as a basis of other substances, such as linseed meal, or inflamed parts may be steamed over boiling water. In cases of abscess, hot fomentations expedite the pointing and relieve tension and pain. Cold water may be used to ulcers, wounds and contusions, either as a dressing or by means of irrigation. In the form of ice it can be sucked in cases of sore throat to reduce local inflammation, and in certain

febrile conditions to lower the general temperature and allay thirst. A glass of cold water taken before food in the morning will often act as a laxative.

*As a hæmostatic.* The local application of ice will frequently restrain hæmorrhage from small blood-vessels. Slight alveolar hæmorrhage is frequently aggravated by the patient continuing to use warm water which the dental surgeon has given him to rinse his mouth after an extraction. In such cases, by stopping the warm water, removing the clots and directing the patient to suck ice, the bleeding will probably cease. In more severe cases the alternate use of cold and hot water (120° F.) will frequently act as a hæmostatic, but as a rule the socket will have to be plugged as well.

Ordinary warm water is also used in dentistry by means of a syringe for washing out cavities and canals of teeth. Boiling water is a most effective sterilising agent for instruments. A copper or enamelled utensil should be used, with a jet of gas underneath to keep the water boiling.

For a description of hot, cold and sitz baths, cold douche, wet pack, etc., the reader is referred to works on hydrotherapy, pharmacology, and therapeutics.

## ARGENTI NITRAS

### SILVER NITRATE

**Formula.**  $\text{AgNO}_3$ .

**Synonym.** Lunar caustic.

**Source.** It is prepared by crystallisation from a solution of pure silver in dilute nitric acid. When fused and solidified in moulds it constitutes the small pencils known as lunar caustic.

**Characters.** It crystallises in rhombic crystals, which are colourless, the action of light causing them to turn black. It is wholly soluble in distilled water—the only preparation of water that should be employed in forming solutions of this salt, as chlorides decompose it.

**Pharmacology.** It is a caustic, styptic, astringent, powerful bactericide and obtundent of sensitive dentine. When applied to the skin, moistened silver nitrate combines with the albuminous materials and leaves a white stain, which soon darkens on exposure to the light or air on account of its reduction to metallic silver by sulphuretted hydrogen. Its caustic effects are limited to the area of application. “On suppurating surfaces the solid nitrate combines with the purulent secretions and forms a greyish layer, stimulates the healing process and causes some burning pain and redness near the part. When the superficial eschar falls (in from twenty-four to forty-eight hours) fresh and healthy granulations are usually found on the wound. Its action does not extend deeply, because of the albuminous pellicle which is formed; therefore the so-called ‘caustic’ effect of silver nitrate must be distinguished from that of destructive agents such as potash or acids, for it is produced by coagulating and hardening the tissues rather than by destroying them” (Phillips).

When employed internally great care must be taken in its administration, as it causes a blue discoloration of the skin (due to the deposit of the metal in a very finely divided state), if continued for any length of time. During its use occasional purgatives should be administered to promote its elimination, and it should

not be given for longer periods than a month or six weeks.

As an obtundent of sensitive dentine its good effects are obtained by virtue of its being a coagulant of albumen and its power of penetrating the dentinal tubes. The great objection to its use is the discoloration it causes.

**General Therapeutics.** It is given internally for dyspepsia, chronic diarrhœa, epilepsy, chorea, asthma, and whooping-cough. Used externally in ophthalmia, diphtheria, erysipelas, hydrophobia, etc. In the treatment of thrush, where milder measures, such as borax, have failed, the patches can be touched with a solution of silver nitrate in the strength of 5 to 10 grains to one ounce of water.

**Dental Therapeutics.** *As a styptic.* It is used to arrest alveolar hæmorrhage after the extraction of teeth, but is not a reliable agent, as the clot formed by it is soluble in an excess of albumen.

*As an obtundent.* It is used to relieve the pain of sensitive dentine, but its use for this purpose must be restricted to back teeth on account of the discoloration it causes. When applied to distal or awkward cavities at the back of the mouth it should be fused on silver or platinum wire. If the stick itself is used it is liable to break and a piece drop down the patient's throat, and so cause serious symptoms. Such a case has been recorded, but the prompt administration of common salt arrested what might have been a fatal case.

*As an astringent.* For the different forms of stomatitis and in any inflamed conditions of the oral cavity it is used as a mouth-wash in the strength of from 1 to 10 grains to one ounce of distilled water. For empyema

of the antrum an injection, 2 to 5 grains to one ounce of water, can be used.

*As a caustic.* It can be applied in the solid form to fungoid growths of the mouth and to granulations due to necrosis of fractured alveolus, the same care being taken as when applying it to sensitive dentine. Should the application in any of the above cases cause excessive pain, a solution of common salt should be used, or, what is better still, a previous application of eocaine *nitrate*, not the hydrochloride, which is incompatible.

**Other Dental Uses.** It is used in dental microseopy as a *staining* agent, chiefly to demonstrate the epithelial nature of Nasmyth's membrane.

**Dose.**  $\frac{1}{4}$  to  $\frac{1}{2}$  grain in pill. This should not be made with breadcrumb, as it contains common salt, which would decompose the silver nitrate.

**Symptoms of Poisoning.** Pain in the œsophagus and stomach. Vomiting of whitish flaky matter, which turns black on exposure to the air. Collapse.

**Antidotes.** Common salt (which forms an insoluble chloride), stomach-tube, emetics, white of egg. To remove recent stains from the cuticle, wash with a solution of common salt and follow with a solution of ammonia; for old stains, rub first with iodine tincture followed by potassium cyanide.

## BORAX

### SODIUM PYROBORATE

**Formula.**  $\text{Na}_2\text{B}_4\text{O}_7, 10\text{H}_2\text{O}$ .

**Synonym.** Sodium biborate.

**Source.** It occurs in the native state, but is also made by boiling together boric acid and sodium carbonate.

**Characters.** Generally seen in irregular masses or six-sided prisms, which are partially soluble in water, freely so in glycerin; insoluble in spirit.

**Preparations.** Glycerinum boracis, mel boracis.

**Pharmacology.** Its action as an antiseptic and disinfectant is similar to that of boric acid, but in a much milder degree. It is also a detergent and antacid and has a sedative effect on the mucous membrane of the mouth and throat.

**General and Oral Therapeutics.** *As a mild antiseptic and detergent.* The glycerinum boracis and mel boracis (the former preferably) are much used for aphthous and other ulcerations of the mouth and slight cases of fissured sore tongue. For mercurial stomatitis, potassium chlorate is certainly preferable. Borax forms a simple and soothing mouth-wash, after numerous extractions, when powdered and mixed with tincture of myrrh in the proportion of a teaspoonful of each in a tumbler of water. Direct the patient to rinse out the mouth several times a day. Should it be necessary to write a prescription, the following can be used:

Sodium biborate	.	.	.	4 drachms.
Glycerin	.	.	.	1 ounce.
Tincture of myrrh	.	.	.	$\frac{1}{2}$ „
Rose-water to	.	.	.	10 ounces.

To be used as a mouth-wash.

**Dental Uses.** It is used in the workroom as a “flux” in fusing and soldering metals; also to harden plaster casts, which should first of all be thoroughly dried, immersed in a boiling solution of borax and water, and then set aside to cool.

**Dose.** 5 to 20 grains.



## CALCIUM COMPOUNDS

The official salts and preparations of calcium used by dentists are as follows :—the precipitated carbonate, the sulphide, chlorinated lime, the hypophosphite, the solution, and the sulphate.

## CALCII CARBONAS PRÆCIPITATUS

## PRECIPITATED CALCIUM CARBONATE

**Formula.**  $\text{CaCO}_3$ .

**Synonym.** Precipitated chalk.

**Source.** Made by mixing boiling solutions of calcium chloride and sodium carbonate.

**Characters.** A white crystalline powder, insoluble in water.

**Dental Therapeutics.** Its chief dental use is as a basis for different kinds of dentifrices, when it acts as an antacid and cleansing agent. It is also employed for polishing gold and amalgam fillings.

**Dose.** 10 to 60 grains.

## CALCII CHLORIDUM

## CALCIUM CHLORIDE\*

**Formula.**  $\text{CaCl}_2\cdot 2\text{H}_2\text{O}$ .

**Source.** Made by neutralising hydrochloric acid with calcium carbonate and evaporating.

**Characters.** Very deliquescent white masses. It should be kept in solution.

\* Should not be confounded with the so-called chloride of lime.

**Pharmacology.** It is an internal hæmostatic.

**Therapeutics.** *As a hæmostatic.* In cases of known or suspected hæmorrhagic diathesis, calcium chloride grains 10 three times a day should be ordered for about three days before the teeth are extracted. The compressed tablets are a very convenient form for its administration.

**Dose.** 5 to 15 grains.

## CALCII HYPOPHOSPHIS

### CALCIUM HYPOPHOSPHITE

**Formula.**  $\text{Ca}(\text{Ph}_2\text{O}_2)_2$ .

**Source.** Made by heating slaked lime and water with phosphorus, purifying the liquid and crystallising.

**Characters.** White pearly crystals, with a nauseous bitter taste. Soluble in 8 parts of water; insoluble in spirit.

**Pharmacology.** It is a nervine tonic and alterative. This salt, together with the hypophosphites of sodium and potassium, are easily absorbed, and their influence on nutrition is very great, especially on tissues like bone, cartilage, and the teeth. They are said to have a beneficial effect on the bones of children affected with rickets on account of the salts of calcium entering so largely into their composition, and as the dental tissues are normally supplied with such a big proportion of calcium phosphate it is only reasonable to think that its internal administration might improve their condition when the lime salts are deficient in quantity. For the same and other reasons the hypophosphites can be given with advantage to pregnant women. Many authorities, however, deny that lime salts are of any use when prescribed for these purposes.



**General and Dental Therapeutics.** It should be given in the form of a syrup to young children where there are evident signs of rickets and after any of the exanthemata, when there is reason to think the permanent teeth which are being developed are likely to be affected. It can be ordered in the form of Fellows' compound syrup of hypophosphites or Parrish's food, and can be combined with cod-liver oil.

**Dose.** 3 to 10 grains. The syrup can be given in teaspoonful doses in water or with a teaspoonful or more of cod-liver oil, according to the way in which the latter drug is assimilated, due regard being paid to the age of the patient.

## CALX CHLORINATA

### CHLORINATED LIME

**Formula.**  $\text{CaCl}_2\text{CaCl}_2\text{O}_2$ .

**Synonym.** Bleaching powder.

**Source.** Made by passing chlorine gas over slaked lime.

**Characters.** It occurs as a whitish powder or in lumps, and has an odour resembling chlorine.

**Pharmacology.** It is a local stimulant, deodoriser, disinfectant, antiseptic and bleaching agent.

**Dental Therapeutics.** *As a bleaching agent.* It is of great value for restoring the colour of dead teeth. For this purpose the following conditions must be carried out :

(a) Obtain a good quality and see that it is thoroughly dry.

(b) Apply the rubber dam, and after the cavity and canal (or canals) have been excavated and shaped,

plug the apical foramen with a pledget of cotton-wool and fill the roots with gutta-percha.

(c) Thoroughly dry the cavity.

(d) Use a wooden or ivory instrument to convey the lime to the cavity, *not* a steel one, as salts of iron would be formed, which would tend to add to the discoloration rather than remove it.

(e) Carefully seal the cavity with gutta-percha and leave the lime in for two or three days.

Its power as a bleaching agent may be greatly assisted by mixing it with acetic acid, which liberates the chlorine, and this product acts by taking up the hydrogen of water and setting free nascent oxygen. An instrument should first be dipped into a weak solution of the acid and then into the lime and conveyed quickly to the cavity. As a rule, it will be necessary to use one or two applications before the tooth is bleached, after which the cavity should be cleansed and an oxychloride filling inserted for a time.

*As an antiseptic and disinfectant.* It is used in cancrum oris, ulcerations of the mouth and to correct foetid breath. For these purposes solutions of chlorinated lime, varying in strength from 10 to 30 grains to one ounce of distilled water, may be used as a gargle or a lotion.

## CALCII SULPHIDUM

### CALCIUM SULPHIDE

**Formula.**  $\text{CaS}$ .

**Synonyms.** Calx sulphurata, hepar calcis, liver of lime.

**Source.** Made by heating a mixture of calcium sulphate and wood charcoal.

**Characters.** A greyish powder with a strong odour of sulphuretted hydrogen.

**Pharmacology.** It is an alterative and purgative. It echeeks inflammation and suppuration. If given early it controls the inflammatory process, either aborting it so that it does not go on to suppuration, or, if this takes place, controlling and limiting its extent, promoting a more healthy formation, quicker evacuation and more rapid subsequent healing (Phillips).

**General and Dental Therapeutics.** It is of great use in eases of simple abscess, boils, earbuncles and quinsy. It is given in eases of dental periostitis and alveolar abscess. As solutions of this drug do not keep, it is best to order it in form of a pill in doses of  $\frac{1}{4}$  to  $\frac{1}{2}$  grain every two or three hours.

**Dose.**  $\frac{1}{4}$  to 1 grain.

## LIQUOR CALCIS

### SOLUTION OF LIME

**Source.** Made by adding distilled water to freshly slaked lime and the cleared fluid poured off.

**Pharmacology.** It is an antacid, astringent, and desiccant.

**General and Dental Therapeutics.** *As an antacid.* It is given to infants in the proportion of one part of lime water to two or thrce of milk (aaccording to age), in cases of vomiting or irritability of the stomach, either from teething or improper feeding.

It is also useful as a gargle in those cases where the saliva is viseid and foetid and the teeth soft in strueture and sensitive.

**Dose.** 1 to 4 fluid ounces.

## CALCII SULPHAS

## CALCIUM SULPHATE

**Formula.**  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ .

**Synonyms.** Gypsum, "Plaster of Paris."

**Dental Uses.** In the surgery it is used for taking plaster impressions of the mouth. The advantages claimed for it over other impression materials are: it causes no pressure on the gums and soft tissues, but copies both without displacing them, and is therefore most useful when taking an impression of a cleft palate.

Its disadvantages are: its disagreeable taste, the difficulties that arise when there are undercuts, and the fact that when hard, a foreign body in the shape of soap or oil, must be smeared over it to prevent the subsequent plaster model sticking to it.

For the way in which plaster impressions are taken the author must refer the reader to works on dental mechanics, as a description would be out of place here.

It is occasionally used as a *mechanical* styptic in cases of hæmorrhage.

## CARBON

$\text{C} = 12$

**Synonym.** Chareoal.

**Characters.** An elementary body found pure, or nearly so, in the diamond, plumbago and anthracite, and is employed in medicine in the form of charcoal, of which there are two varieties, wood and animal.

**Carbo Ligni.** *Wood charcoal.*

**Source.** Wood burnt without the access of air.

**Characters.** A black substance without odour or taste.

**Pharmacology.** It is an antiseptic, disinfectant, antacid, deodorant and carminative.

**General and Dental Therapeutics.** It is of great benefit in cases of acidity of the stomach with flatulence and distension, when taken pure (cachets), or in the form of biscuits. Employed locally as a disinfectant and deodorant to foul ulcers and cancers in the form of poultices. It is used to correct the fœtor of ulceration of the cheeks and face. Also occasionally as an ingredient of tooth-powders; but its employment for this purpose is inadvisable, as it is said to cause recession of the gums and a blue discoloration not unlike that of lead poisoning.

**Carbo Animalis.** *Animal charcoal* (not official).

**Synonym.** Bone-black.

**Source.** Obtained by exposing bones to a red heat without the admission of air and powdering the residue.

**Characters.** A greyish-black powder insoluble in water.

**Preparation.** Carbo animalis purificatus. Purified animal charcoal.

**Pharmacology.** It is a decolouriser and an antidote to vegetable poisons.

**General Therapeutics.** Its great value is as an antidote in poisoning by opium, nux vomica, aconite and other organic poisons. Half an ounce will neutralise 1 grain of morphine or strychnine.

**Doses.** Of wood charcoal, 60 to 120 grains or more.

Of animal charcoal, 20 to 60 grains or more.

As an antidote,  $\frac{1}{2}$  ounce repeatedly.

## CUPRI SULPHAS

## COPPER SULPHATE

**Formula.**  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ .

**Synonyms.** Cupric sulphate, blue vitriol, copperas, blue stone.

**Source.** Made by heating copper with sulphuric acid, dissolving the soluble product in hot water, evaporating and crystallising.

**Characters.** Deep blue crystals with a strongly styptic and metallic taste.

**Pharmacology.** It is a caustic, local stimulant, astringent, antiseptic and rapid emetic. If it fails to induce vomiting the contents of the stomach must be evacuated by some other means, as it is an irritant poison.

**General Therapeutics.** Its great value is as an emetic, particularly in cases of narcotic poisoning. It is also an antidote in cases of phosphorus poisoning; 3 grains should be given in water every few minutes until vomiting occurs, when a free saline purgative should be administered. Applied locally, it is used as a caustic and local stimulant for touching granular lids, ulcers, wounds, etc.

**Dental Therapeutics.** *As a stimulating astringent.*

In aphthous stomatitis it can be applied to the white curdy deposits, either in the solid form or as a strong solution, and will cause their removal. The raw surfaces beneath can then be treated with some less stringent remedies, such as borax and honey.

The same treatment can be followed in all cases of ulcerations of the mucous membrane of the mouth.

*As a caustic.* The crystal can be applied to fungoid

growths of the gums and to soft and spongy granulations.

*As an antiseptic.* It is of great use in cases of pyorrhœa alveolaris. For this purpose it can be used, after removal of the tartar, either dry or as a saturated solution. When used dry, pack some of the powdered crystal in the pockets or pouches of the gum with non-metallic instruments and leave it in for half an hour; it should then be carefully removed and the parts well syringed with warm water. If a saturated solution be used, take a piece of orange-wood, taper it to a thin edge which should be roughened, and twist on a little cotton-wool; dip this into the solution and pass it into the pockets several times.

**Other Dental Uses.** It is used in the preparation of copper amalgams, and although such fillings may shrink more than some silver alloys and have less edge strength, yet its value as an antiseptic material is very great.

**Dose.**  $\frac{1}{4}$  to 2 grains. As an emetic, 5 to 10 grains.

**Symptoms of Poisoning.** Metallic taste in the mouth griping pains, vomiting, purging. Collapse, coma.

**Antidotes.** White of egg, to be followed by use of stomach-tube and emetics.

## FLUORAM

(NOT OFFICIAL)

**Source.** This is a salt which is a derivative of hydrofluoric acid by neutralising it by ammonium carbonate.

**Characters.** White odourless crystals having a taste of lemon-juice.

**Pharmacology.** According to Dr. Kritchewsky this drug, which is practically ammonium bi-fluoride, acts



as a solvent of tartar and is also a bactericide. In a paper read before the Dental Society of Europe he says: "Fluoram is the only antiseptic which destroys the microbes and does not at the same time destroy the living cells. The blood remains indefinitely incoagulable in the presence of bifuoride of ammonia, but the fibrin and fibrinogen are not destroyed and will again coagulate when the bichloride of ammonia is taken away from it. This fact, it seems to me, explains the action of this salt on the soft tissues, which destroys the microbes, leaving the cells of the tissues in a healthy state and once more in proper condition to assume their natural function and fight against the disease." He also claims for it that it is an obtundent of sensitive dentine.

**Dental Uses.** *As a solvent.* From experiments made by Kritchwisky and Joseph Head (of Philadelphia) it seems that both hydrofluoric acid and its salts have a special action in dissolving tartar, yet at the same time neither acts on the enamel of the teeth. Hydrofluoric acid is too caustic in its action to allow of it being used in the mouth, but the ammonium bifuoride, to which the name "Fluoram" has been given, can be used with safety and practically causes no pain.

It should be used as follows: after having removed as much of the tartar as possible, take up some of the crystals of fluoram with a platinum probe or a canal bristle and fill the pockets round the teeth. The probe can either be moistened or a wisp of cotton-wool wrapped round to make the fluoram adhere. The application should be allowed to remain half an hour and then syringed out. Some advocate leaving the crystals in, when they gradually dissolve. Two or three applications will be necessary and there may be a little pain at first.



## HYDRARGYRUM

MERCURY (Hg = 198·8)

**Synonym.** Quicksilver.**Source.** It is found either pure or combined with sulphur as the sulphide, from which it is obtained by roasting or distilling with lime.**Characters.** At ordinary temperatures it is a fluid metal of a nearly silver-white colour and a high degree of lustre. When pure it has neither taste nor smell, and on exposure to the air does not readily tarnish. Should tarnishing occur it implies the presence of other metals, such as lead, zinc or bismuth. It is susceptible of such division that it may be squeezed into minute globules through chamois leather.**Preparations of the Metal :**

Hydrargyrum cum cretâ, “grey powder”;

Emplastrum hydrargyri;

Emplastrum ammoniaci cum hydrargyro;

Linimentum hydrargyri.

Pilula hydrargyri, “blue pill”;

Unguentum hydrargyri, “blue ointment.”

Unguentum hydrargyri compositum, “Scott’s ointment.”

**Pharmacology.** Metallic mercury when taken into the stomach does not have any effect, and passes out of the body unchanged. It is, however, used as an *alterative* in the form of the “blue ointment” and as an *alterative* and *purgative* in the form of “grey powder” and “blue pill.” It is also a sialogogue.**General Therapeutics.** It is of great use in infantile syphilis when applied in the form of the unguentum aided by friction. The hydrargyrum cum cretâ is

administered as a purgative in some of the diseases of children, and  $\frac{1}{3}$  of a grain every hour or two hours will often cure the diarrhœa of infancy. The "grey powder" combined with opium to prevent purgative action, is also employed in the secondary stages of syphilis. Mercury and its preparations are contra-indicated in patients of a weak and anæmic condition, unless strictly antisyphilitic measures are necessary. Infants, on the other hand, bear mercury well; but, from a dental point of view, it should be remembered its prolonged administration may produce very deleterious effects on the second dentition. Honeycombed or "mercurial" teeth, as described by Mr. Jonathan Hutchinson, may or may not be caused by the action of mercury; but due consideration must be given to the fact that when this drug is being given for any of the exanthemata of infancy the permanent teeth are being developed, and therefore the cause of their deformity when erupted, must not be put down *entirely* to the effects of the drug, as the exanthemata are known to affect all epithelial structures.

**Dental Therapeutics.** It is used in dental practice as an ingredient of amalgam fillings, being combined for such purposes with silver, tin, zinc, copper, palladium, platinum and gold. The amalgam should never be mixed in the hand. It is not a cleanly process, and in addition it ultimately causes the filling to become porous. It is also employed to assist in the removal of amalgam fillings, when several small holes should be drilled into the filling, and the mercury conveyed to them on an amalgam carrier with roughened edges to which the mercury quickly attaches itself, as the carrier has generally some small particles of old amalgam adherent to it. The mercury should be well rubbed

into the holes with a small burnisher and in a few minutes the filling will soften and erumble out easily.

**Doses.** Hydrargyrum eum eretâ, 1 to 5 grains, according to age, and in smaller doses as mentioned above. Pilula hydrargyri, 4 to 8 grains.

**Symptoms of Mercurial Poisoning.** The first indication is generally noticed by the gums becoming swollen and assuming a dark red colour. This is followed by salivation which becomes very profuse, dyspepsia and diarrhœa. These symptoms are accompanied and followed with fœtid breath, swelling of the tongue, ulceration of the mouth, loosening of the teeth and necrosis of the jaws. The patient gets pale and wastes away, a low febrile condition sets in, *exzema mercuriale* may occur and various nervous phenomena, such as paralysis and mental disturbance present themselves, and unless antidotes are administered and the drug stopped death would occur.

**Antidotes.** Discontinue the use of mercury and give potassium ehlorate both internally and as a mouth-wash. Mouth-washes of potassium permanganate, listerine, or any favourite disinfectant, can also be used to correct the fœtor of the breath, and tonics should be prescribed.

## COMPOUNDS OF MERCURY

The mercurials used by dentists are, the perchloride, the subehloride and the sulphide.

### HYDRARGYRI PERCHLORIDUM

#### MERCURIC CHLORIDE

**Formula.**  $\text{HgCl}_2$ .

**Synonyms.** Corrosive sublimate, bichloride of mercury, perchloride of mercury.

**Source.** It is made by heating a mixture of mercuric sulphate, sodium chloride and manganese dioxide.

**Characters.** It occurs in heavy white crystalline masses of prismatic crystals and is of a styptic and metallic taste. Soluble in 1 in 16 of water, 1 in 3 of alcohol. It must be dissolved in distilled water, as ordinary water decomposes it.

**Preparations.** Liquor hydrargyri perchloridi, lotio hydrargyri flava.

**Pharmacology.** It is an antiseptic, germicide, alterative, sialogogue and irritant. It is the most powerful antiseptic and germicide we have and great care must be taken when using it in the mouth. It has a strong affinity for water, and thus robs bacteria of one element of their existence, viz., moisture. 1 part in 10,000 destroys micrococci and bacilli. 1 in 1000 destroys their spores.

**General Therapeutics.** It is given internally in syphilis both in the secondary and tertiary stages. In the latter case it is best combined with potassium iodide in the following proportions :

Solution of the perchloride of				
mercury	.	.	.	1 ounce.
Potassium iodide	.	.	.	80 grains.
Water to	.	.	.	8 ounces.

Two tablespoonfuls to be taken three times daily. With this combination mercuric biniodide is formed in the system, which is a most powerful remedy.

It is much used as an antiseptic dressing in combination with cotton-wool, etc. Also given internally in infantile diarrhœa with slimy stools, whether due to teething or not, as follows :

Solution of mercuric chloride . . . 24 drops.

Dill water to . . . . . 1 ounce.

One teaspoonful to be given every 3 or 4 hours.

**Dental Therapeutics.** *As an antiseptic and germicide.* Many years ago this drug was introduced into dental practice for the treatment of dead teeth and the term "immediate" root filling was first used. It is now to a great extent superseded by such drugs as formalin, sodium dioxide, etc. The mode of procedure was as follows :

First *apply the rubber dam*. Then excavate and shape the cavity, open up the pulp chamber, drill out the root canals, syringe them with warm water and afterwards pump up chloroform to remove any greasy material. In reaming the canals great care must be taken to prevent septic material being forced through the apical foramen. The canals should next be well dried with the hot-air syringe and afterwards syringed out several times with 1 in 500 alcoholic solution of the perchloride. The *rationale* of this is that the hot air desiccates the organic particles, when they eagerly absorb the alcoholic solution. Some fine strands of cotton-wool should then be prepared on a Donaldson bristle for carrying an oxychloride cement into the canals. Whilst this is being done, and the cement is being mixed, the solution is left soaking into the canals. This leaves their walls moist—a matter of some importance, for, if wet, the oxychloride will penetrate more quickly than if dry. When the canals are filled the remainder of the cavity can be finished with some suitable material.

For the "immediate" treatment of dead teeth

with this drug its advocates claimed that it seldom caused any subsequent periostitis, there were fewer extractions and failures than with the "dressing" method and that it also saved the time of both operator and patient.

In the treatment of teeth where the apical foramen is large, as in young children, the 1 in 500 solution should be used cautiously, whilst the 1 in 2000 can be used with impunity. Some advocate using it with alcohol, others with water; but the former has many advantages, though it should always be remembered that alcoholic solutions of this and other drugs must be kept *well stoppered*, otherwise some of the alcohol will evaporate and leave a more concentrated solution.

The strength of the solution to be used varies from 1 in 200 to 1 in 2000 of water or alcohol. Weaker solutions than this are antiseptic, but will not kill germs.

A solution of 1 in 2000 can be used for dipping instruments into before applying to the mouth, also for the fingers of the operator, or, in fact, anything that may come in contact with the teeth or gums in any operations in the mouth.

In pyorrhœa alveolaris the following can be used with advantage, after thorough scaling :

Perchloride of mercury	.	.	1 grain.
Peroxide of hydrogen	.	.	1 ounce.

Saturate small pledgets of cotton-wool with the solution and swab out the pouches round the teeth.

In ulcerative stomatitis, by *carefully* touching the ulcerated spots with the 1 : 200 solution, great benefit may be derived.

*As a mouth-wash* its use, strong enough to be of



any advantage, is to be deprecated on account of its poisonous properties ; but the Pharmacopœia solution can be safely used as follows :

Solution of mercuric chloride	.	1½ ounces.
Tincture of calendula	.	4 drachms.
Water to	.	4 ounces.

**Other Dental Uses.** It is most useful as a *fixing* reagent in dental microscopy. Mr. G. G. Campion uses a mixture of this drug and spirit as a *fixing* and *hardening* reagent for preparing specimens of the pulp.

**Doses.**  $\frac{1}{32}$  to  $\frac{1}{16}$  grain ; of the solution  $\frac{1}{2}$  to 1 drachm.

**Symptoms of Poisoning.** Lips and mouth white and swollen, metallic taste, constriction in throat, pain in stomach, nausea, vomiting, purging, collapse, death.

**Antidotes.** Emetics, white of egg (unboiled), this forming an insoluble albuminate of mercury ; stimulants, stomach-tube.

When using a strong solution of the perchloride without the rubber dam, and severe inflammation is set up, through its coming into contact with the soft tissues of the mouth, either apply a solution of cocaine or paint the parts with aconite tincture to relieve the pain.

## HYDRARGYRI SUBCHLORIDUM

### MERCUROUS CHLORIDE

**Formula.**  $\text{Hg}_2\text{Cl}_2$ .

**Synonyms.** Calomel, subchloride of mercury.

**Source.** Prepared by subliming mercurous sulphate and sodium chloride.

**Characters.** A dull white, heavy, insoluble powder.

**Pharmacology.** It is an alterative and purgative.

**General and Dental Therapeutics.** It is given as a purgative in infantile convulsions due to teething in doses of  $\frac{1}{2}$  to 2 grains or more, according to age. As there is some difficulty in administering powders to infants a good plan is to take a piece of butter the size of a pea, roll it in the powder and place it with a finger to the back of the child's throat, where it quickly melts. Sodium or potassium bromide should also be given. (See page 108.)

**Dose.**  $\frac{1}{2}$  to 5 grains.

## HYDRARGYRI SULPHIDUM RUBRUM

**Formula.**  $\text{HgS}$ .

This is not now employed therapeutically to any extent.

**Dental Uses.** It is employed in the manufacture of dental rubber. Cases of mercurial poisoning have been reported from wearing rubber dentures, as also from amalgam fillings. In all probability this would be due to a peculiar idiosyncrasy on the part of the patients which rendered them unduly susceptible to the drug.

## HYDROGENII PEROXIDI LIQUOR

### HYDROGEN PEROXIDE SOLUTION

**Formula.**  $\text{H}_2\text{O}_2$ .

**Synonyms.** Hydroxyl, hydrogen dioxide. "Dioxogen" is a coined name for a 3 per cent. hydrogen peroxide solution.

**Source.** Obtained by treating barium peroxide with dilute sulphuric acid, and filtering. It should yield ten times its volume of oxygen.



**Characters.** It is a colourless, odourless liquid with a bitter taste. It easily decomposes, and should be kept in dark, well-stoppered bottles. It is the chief constituent of "Sanitas." It may contain impurities in the shape of hydrochloric and sulphuric acids. The official solution should contain ten volumes of available oxygen. It is also made two, three, and ten times this strength.

**Pharmacology.** It is an antiseptic, germicide, preventive of fermentation, styptic and bleaching agent.

Its value as an antiseptic is due to the fact that it is a very unstable chemical compound, from which oxygen is quickly liberated by contact with substances having an affinity for it. It therefore oxidises or destroys all micro-organisms and pus cells. It is a very active and harmless agent for sterilising putrid cavities and substances, differing in its action from other drugs such as formalin, mercuric chloride, carbolic acid, etc., as these agents, although powerful antiseptics, may cause dangerous results from their caustic irritating properties if used in a concentrated form, whereas the hydrogen peroxide possesses none such qualities.

**General Therapeutics.** It is used as a spray for diphtheria, tonsillitis, non-syphilitic ozæna and ulcerative stomatitis. It is also credited with hæmostatic powers in epistaxis. It has been recommended for various diseases such as diabetes, epilepsy and lung affections.

**Dental Therapeutics.** *As an antiseptic and germicide.* It is used in the treatment of dead teeth, one of its advantages over other antiseptics being the evolution of gas which takes place whilst any putrescent matter remains in the canal or canals. For dead teeth with fistulous openings on the gum it should be pumped

up the pulp canal with a small syringe and the cavity at once well plugged with gutta-percha. As soon as the peroxide comes in contact with the fœtid pus it will bubble out at the fistulous opening. It is very useful as a test of assepsis after other antiseptics have been used.

In pyorrhœa alveolaris it is most useful combined with mercuric chloride and as an after treatment when aromatic sulphuric acid has been used to dissolve away small particles of tartar and the carious margins of the alveolus. Here, as in other cases, the application of the peroxide must be persevered with till effervescence ceases. For painful ulcers of the mouth an application of the ordinary solution is useful.

One may be quite sure of all excavators, bristles, etc., being aseptic by dipping them in a small vessel containing the peroxide. Should the slightest sign of bubbling occur, which is shown by a white streak or patch, it will be known they have not been properly sterilised.

*As a bleaching agent.* It can be used to remove the discoloration of dead teeth. Dr. A. W. Harlan suggests the use of aluminium chloride for this purpose, from which chlorine is liberated by the hydrogen peroxide.

Stains on the teeth, especially those around the gum margin, are easily removed by means of small brushes dipped in a mixture of powdered pumice and hydrogen peroxide.

*As a styptic.* It has been recommended for this purpose in hæmorrhage after tooth extraction, but other drugs are to be preferred. It is, however, useful in those cases where one is excavating a cavity near the gum and injures it: by applying hydrogen peroxide the oozing will cease. This is in all probability due to a mechanical action rather than chemical. After using

this drug the teeth should be syringed with warm water on account of its acid action (due to impurities) on the dental tissues.

**Dose.**  $\frac{1}{2}$  to 2 drachms.

*Perhydrol* is the registered name for Merck's chemically pure and acid-free hydrogen peroxide, and contains 30 per cent. by weight of absolute hydrogen peroxide; one volume of perhydrol when decomposed evolves 100 volumes of oxygen. The strength of perhydrol is therefore referred to as "30 per cent. by weight"; or, "100 volumes," the first designation indicates its content of absolute hydrogen peroxide, the second the amount of available oxygen. The relation of percentage to volume is as 1 to  $3\frac{1}{3}$ . If left in the original bottle, which is coated with paraffin, it will keep for a considerable time without loss of concentration.

## IODUM

IODINE (1 = 125.9)

**Source.** It is obtained from kelp, the ashes of seaweed, and from the mineral iodides and iodates.

**Characters.** Laminar crystals of a dark colour and lustre, which have a peculiar odour; sparingly soluble in water, freely so in a solution of potassium iodide or sodium chloride, ether, and alcohol 90 per cent.

**Preparations.** The liquor iodi fortis (the old B.P. liniment), tinctura iodi and unguentum iodi. The liquor is the strongest, its strength being  $11\frac{2}{3}$  per cent. of iodine, whilst the tincture is only  $2\frac{1}{2}$  per cent.

**Pharmacology.** Applied externally, it is a counter-irritant, vesicant, absorbent, antiseptic and disinfectant, and given internally in the shape of potassium iodide

it is an absorbent and alterative. In this form it may cause a condition known as "iodism," symptoms of which are erythema, sneezing, headache, great depression, swelling and redness of the gums, hard and soft palate and fauces, foulness of the tongue and an eruption on the skin.

**General Therapeutics.** The liquor, tincture and ointment are used as stimulants and disinfectants to foul ulcers and as counter-irritants in subacute and chronic inflammation of joints, periosteum, glands, etc.; also in bronchocele, in conjunction with the internal administration of potassium iodide. In phthisis and most of the diseases of the lungs the tincture or liquor is used with great benefit as a paint.

It is given internally in the form of potassium iodide to obviate its irritant effects. (See page 112.)

**Dental Therapeutics.** *As a counter-irritant and vesicant.* In dental periostitis apply equal parts of the tincture or liquor and aconite tincture (Fleming's) to the gum round the painful tooth or teeth with a camel's-hair brush or a suitable small mop of cotton-wool. The gum should be first dried, and after the application the cheek should be held away from the part for a few seconds to prevent the drug being washed off by the saliva. In about the space of half a minute it will be noticed that a metallic film has formed. The painting of these drugs on the gums will sometimes prevent the formation of an alveolar abscess. The tincture is useful for injections into cysts and ranulae, when it acts as an irritant. In cases of ranula a very good method of effecting a cure is to take up with a pair of forceps the upper surface of the cyst and excise a large piece with a pair of curved scissors, evacuate the contents of the cyst and plug with a strip of lint soaked

in iodine tincture. This should set up inflammation, cause granulation tissue to form and bring about adhesion of the walls of the cavity.

*As an absorbent.* It is used for painting over enlarged glands, and for this purpose a colourless tincture may help, either with sodium hyposulphite in the following proportions :

Hyposulphite of sodium . . . 40 minims.

Iodine tincture . . . 1 ounce

or by adding a strong solution of ammonia to the iodine tincture, leaving it in a warm place until it has lost its colour and afterwards diluting with rectified spirit. This colourless preparation, however, does not act nearly so strongly as the ordinary tincture.

In cases where the cheek is swollen from a commencing alveolar abscess resolution may happen by painting a ring of the tincture round the swelling and covering the swelling itself with flexile collodion (see Collodion), but the case must be watched as pus may form and break under the collodion and cause an unsightly scar.

In empyema of the antrum of a chronic nature an injection which is both irritant and antiseptic in its action is most serviceable, and the following can be used :

Tincture of iodine . . . 1 drachm.

Carbolic acid . . . 10 drops.

Water to . . . 4 ounces.

*As an alterative.* In mercurial stomatitis the following is a very useful prescription :

Tincture of iodine . . . 3 to 4 drachms.

Iodide of potassium . . . 15 to 30 grains.

Water to . . . 10 ounces.

To be used as a mouth-wash.

**Other Dental Uses.** On account of its affinity for iron the tincture is used to loosen or remove the fragments of an instrument broken in a canal, when the removal of such is absolutely necessary. The advisability of doing this, however, is doubtful, as iodine weakens the shaft so that it breaks again and leaves the head *in situ*.

To remove stains of iodine from the hands of the operator or lips or cheeks of a patient, use a solution of sodium hyposulphite (1 drachm to an ounce).

**Dose.** Of the tincture 2 to 5 minims diluted. Iodine itself is not given internally.

**Symptoms of Poisoning.** Pain and heat in throat and stomach, vomiting and purging (vomited matter may be blue if any starchy foods are in the stomach), faintness and collapse.

**Antidotes.** Starch (which forms an insoluble iodide of starch), emetics, stomach-tube.

## LIQUOR FERRI PERCHLORIDI FORTIS

### STRONG SOLUTION OF FERRIC CHLORIDE

**Source.** Made by dissolving iron wire in hydrochloric acid and water, adding hydrochloric acid and nitric acid, evaporating and diluting.

**Characters.** An orange-brown liquid with a strong styptic taste.

#### **Preparations.**

Liquor ferri perchloridi (1 of strong solution to 3 of water).

Tinctura ferri perchloridi (1 of strong solution to 1 of spirit and 2 of water).

**Pharmacology.** *Externally* it is a local styptic, astringent and escharotic. It acts as a true styptic by causing



a coagulum to form, at the same time it narrows both arteries and veins at the point of application whilst the neighbouring vessels become dilated. The objections to its use as a styptic are: (1) its caustic action, with liability to sloughing and secondary hæmorrhage; (2) in cases of wounds it prevents union by first intention, but this does not apply to the way the gum heals after the extraction of a tooth. Its advantages, however, quite outweigh its disadvantages when properly used.

It causes discoloration of the teeth, more particularly when they are carious, the sulphuretted hydrogen precipitating the iron (in the form of the sulphide) from the solution. Even when the teeth are perfectly sound, discoloration may still occur from the presence of tannic acid in various articles of food, and in tea and other drinks, the precipitate in this case being a tannate and not a sulphide (Murrell). It has also anti-septic properties on account of its action on albumen.

*Internally* it is a hæmatinic, tonic, and alterative.

**General Therapeutics.** It is administered for the various forms of hæmorrhage, whether from the nose, stomach, intestines, bladder or uterus; but, as a rule, not from the lungs. As a hæmatinic it is given in anæmia, and it is said to be a specific for erysipelas and diphtheria. In severe hæmorrhage from the tonsil, take a flat piece of wood and wrap the end of it with a piece of lint, dip it into a solution and apply with pressure to the wound.

**Dental Therapeutics.** *As a styptic.* The following directions should always be carried out. First of all clear away all clots, mop out the socket or sockets, make the patient wash the mouth with cold water, and plug with a pledget of cotton-wool. Allow this to

remain for a few minutes, and on its removal it will be seen (in cases of teeth with more than one root) which socket the hæmorrhage is coming from. This should at once be plugged with a pledget of cotton-wool, which has been dipped in the strong solution of the ferric chloride and all excess squeezed out of it, on the top of which place a good pad and tell the patient to bite firmly on it. In young children it is necessary at times to bind up the jaw with a four-tailed bandage. In all cases a few general directions should be given to the patient, such as keeping quiet, remaining in an upright position, avoiding stimulants and taking everything cold. This local treatment can be combined with the internal administration of the solution of the ferric chloride in 15-minim doses every two hours, especially when the blood on emerging from the socket shows no disposition to coagulate. The plug should be removed after twenty-four hours, a recurrence of the hæmorrhage being chanced, otherwise septic trouble may arise. The author prefers the strong solution, as its astringent effects are very great. In certain cases it may be used with a little water or glycerin.

Before the introduction of adrenalin into dental surgery the author always used this drug in preference to any other for hæmorrhage after tooth extraction. The great objection to its use was on account of its caustic action, but this should never occur when properly applied. The plug of cotton-wool should never contain an excess of the drug: all that is wanted is to have sufficient so that however much pressure is used in the plugging, very little (if any) of the drug can come into the mouth. In a big majority of cases the hæmorrhage will cease if the socket or



sockets are *carefully plugged*, quite independent of any drug. It is of little or no use merely *placing* a plug in.

In simple cases of hæmorrhage from a tooth socket pledgets of cotton-wool, which have been soaked in the solution and allowed to dry, will be found efficacious, and they have little or no caustic effect. According to some authorities the crystal of the perchloride may be used as a styptic, but its caustic effect is so great that its use is to be deprecated.

*As a tonic and hæmatinic.* In neuralgia due to anæmia the tincture is most advantageous in doses of 15 minims to 1 ounce of water three times daily. In such cases it relieves pain by its effect on the red corpuscles of the blood.

**Other Dental Uses.** The solution is one of the staining reagents in dental microscopy. Mr. Howard Mummary has succeeded in tracing numerous fine fibres from the nerve bundles in the pulp by this method.

**Doses.** Of the solution, 5 to 15 minims.

Of the tincture, 5 to 15 minims.

## MAGNESIUM COMPOUNDS

The compounds of magnesium used by dentists are the carbonate and sulphate.

**Magnesii Carbonas Ponderosus,** HEAVY MAGNESIUM CARBONATE.

**Magnesii Carbonas Levis.** LIGHT MAGNESIUM CARBONATE.

Both of these are antacids and are used for this purpose as ingredients of dentifrices in the proportion of  $\frac{1}{2}$  ounce to 2 ounces of precipitated chalk. The

heavy magnesia is three and a half times as heavy as the light.

**Magnesii Sulphas.** *Magnesium Sulphate* (Epsom salts) is a simple useful purgative, and may safely be prescribed in cases of acute periostitis and alveolar abscess in the form of "haustus albus," *i.e.* :

Sulphate of magnesium . . . 6 drachms.

Carbonate of magnesium . . . 1 drachm.

Peppermint water . . . 6 ounces.

Two tablespoonfuls to be taken three times a day.

**Doses.** Of the *carbonate*, 5 to 30 grains for repeated administration; 30 to 60 grains for a single dose.

Of the *sulphate*, 30 to 120 grains for repeated administration;  $\frac{1}{4}$  to  $\frac{1}{2}$  ounce for single dose.

There are two proprietary preparations on the market: Phillips' "milk of magnesia" and "Mag-lactis."

*Milk of magnesia* and *maglactis* are supposed to contain hydrate of magnesia. One of the most important factors of caries, erosion and sensitive dentine is the acidity of the fluids of the mouth, which is due to various causes, such as gout, dyspepsia and lodgment of particles of food between the teeth. All these set up an acid fermentation which tends to destroy the enamel of the teeth. Both of these preparations are odourless and practically tasteless, and look like milk; they are therefore very useful drugs for children. A teaspoonful should be used three times a day, or night and morning, but particularly at night, and the mouth should not be rinsed afterwards.

## PHOSPHORUS

PHOSPHORUS ( $P = 30.8$ )

**Source.** Obtained from calcium phosphate.

**Characters.** It is obtained as a colourless oily fluid, which solidifies in cakes or rounded hollow pencils, and these are semi-transparent and wax-like; luminous in the dark, igniting in the air; insoluble in water, sparingly soluble in ether, oils and alcohol. It must be kept under water.

**Preparations.** Oleum phosphoratum, pilula phosphori.

**Pharmacology.** It has a special effect in causing inflammation of the periosteum and bone with necrosis of exposed parts, such as the maxillæ and teeth. It is only when the phosphorus vapour directly reaches the periosteum or some raw vascular surface immediately connected with the nutrition of bone and when its application is prolonged under particular circumstances of temperature and oxidation that its injurious effects are witnessed. Hence it is, when there are carious teeth in the jaw and the fumes of phosphorus can act directly on the exposed pulp, or there is a wound in the mouth, that necrosis occurs. The disease is more common in the lower jaw than the upper. It has also attacked the palate and frontal bones (Phillips). The manufacture of "safety" matches from red phosphorus has rendered the disease far less common than formerly. It is a nervine tonic and stimulant.

**General Therapeutics.**—It is given for nervous prostration, paralysis agitans, locomotor ataxy and for the relief of neuralgia. For the last it is said to be a

good remedy, even after other drugs, such as gelsemium and ammonium chloride, have failed.

**Doses.**  $\frac{1}{100}$  to  $\frac{1}{20}$  grain.

Of the oil . . . 1 to 5 minims.

Of the pill . . . 1 ,, 2 grains.

**Symptoms of Poisoning.** Pain in stomach, vomiting (not always persistent). Vomited matters may be luminant in the dark, odour of phosphorus in the breath. Tendency to hæmorrhage, convulsions. Death may occur suddenly.

**Antidotes.** Copper sulphate, which forms not only a black phosphide which is non-poisonous, but also acts as an emetic. French oil of turpentine, which contains plenty of ozone, is also an antidote, converting phosphorus into hypophosphoric acid. Stomach tube.

## PLUMBI ACETAS

### LEAD ACETATE

**Formula.**  $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 3\text{H}_2\text{O}$ .

**Synonym.** Sugar of lead.

**Source.** Made by dissolving lead oxide or carbonate in acetic acid and water.

**Characters.** White, spongy-looking masses made up of small interlaced acicular crystals. It has an acetous odour and a sweetish metallic taste. Soluble in water.

**Pharmacology.** *Externally* it acts as a sedative, astringent and hæmostatic. When applied to raw or abraded surfaces it combines with the albumen and thus covers the part with a protective coating. When taken into the mouth it acts as an astringent on the mucous membrane.

*Internally* it is an astringent, hæmostatic and powerful poison. Workers in lead and its salts are liable to be poisoned thereby, but lead may be introduced into the system in many other modes far too numerous to mention here.

The symptoms of lead poisoning, to which the terms “plumbism” or “saturnism” are applied, may be briefly described as follows :

- (1) Cæhexia.
- (2) Blue line on the gums.
- (3) Colic, “lead colic,” “painters’ colic.”
- (4) Cramps.
- (5) Lead paralysis, or “wrist-drop.”
- (6) Nervous phenomena.

The symptom of most interest to the dentist is the blue line on the gums. This is generally one of the first symptoms to appear and the last to disappear. It is observed on the gums round the necks of the teeth, but it may spread to the whole of the gums and the contiguous lips and cheek. It is always more marked on the lower than the upper gums, and in the incisor more than the molar region. The symptom is missing where there are no teeth and is more marked in those who do not clean their teeth. It is caused by sulphuretted hydrogen developed from the tartar of the teeth penetrating the gums and forming the black lead sulphide. The condition must be diagnosed from

(1) The discoloration of the margin of the gum which takes place in those people who clean their teeth with charcoal ;

(2) A deposit occurring in people exposed to carbon dust, as are miners ;

(3) A bluish line caused by a thin layer of black tartar ;

(4) Copper and bismuth may also cause a blue line on the margins of the gums.

**General and Dental Therapeutics.** Used locally as a sedative and astringent in cases of eczema, pruritus, and many varieties of ulceration. Given internally for diarrhœa and hæmorrhage.

*As a hæmostatic.* It can be given, combined with opium, in the form of the lead and opium pill (2—4 grains) in severe cases of alveolar hæmorrhage, where the administration of ergot is inadvisable. As, however, time would be required to dissolve the pill, and as in such cases urgency would be of the greatest importance, the following prescription would more likely meet the case :

Acetate of lead . . . .	5 grains.
Solution of the acetate of morphine	10 minims.
Dilute acetic acid . . . .	15 „
Cinnamon water to . . . .	1 ounce.

To be taken every two hours until the hæmorrhage ceases. With either of these remedies local treatment would also have to be persevered with.

The treatment of chronic lead poisoning (acute cases are rare) in so far as it affects the teeth, is to see that the patient takes extra care in cleaning them, that the cause is removed and potassium iodide is given internally.

**Dose.** 1 to 5 grains.

## POTASSIUM COMPOUNDS

The compounds of potassium are very numerous. Those used in dentistry are the bicarbonate, bromide, hydroxide, chlorate, iodide and permanganate.

## POTASSII BICARBONAS

## POTASSIUM BICARBONATE

**Formula.**  $\text{KHCO}_3$ .

**Source.** Made by saturating a strong aqueous solution of the carbonate with carbonic acid gas, and recrystallising the separated salts.

**Characters.** Colourless, transparent, prismatic crystals. Soluble in water. Alkaline.

**Pharmacology.** It is an antacid, diuretic and antilithic.

**General and Oral Therapeutics.** Given for gout, rheumatism, dyspepsia.

*As an antacid.* This drug and the sodium bicarbonate (see page 116) have practically the same dental uses. A solution of either is useful as a mouth-wash after using any of the mineral acids or ferric chloride.

**Dose.** 5 to 30 grains.

## POTASSII BROMIDUM

## POTASSIUM BROMIDE

**Formula.**  $\text{KBr}$ .

**Source.** Obtained by adding bromine in slight excess to potassium hydroxide, heating with charcoal, dissolving and crystallising.



**Characters.** Colourless cubical crystals resembling those of the potassium iodide, but smaller; no odour, taste saline. Soluble in water, less so in spirit.

**Pharmacology.** It is a sedative, hypnotic and antispasmodic. In full doses the earliest effects are seen in the nervous system, and after a long course it sets up a condition known as *bromism*, which is characterised by great depression, weakness of mind, headache, pallor and unsteady gait. The "bromides" generally produce diminished reflex action of the soft palate, but no anæsthetic effects take place.

**General and Oral Therapeutics.** Given for cerebral affections, such as epilepsy, hysteria, convulsions, sea-sickness, insomnia, the vomiting of pregnancy, asthma and migraine. It should not be forgotten that its prolonged administration is liable to produce a rash.

In infantile convulsions of dental origin it is of great value. In such cases it is best to give a purgative in the form of calomel ( $\frac{1}{2}$  to 2 grains) first. This should be followed by—

Bromide of potassium	.	24 to 40 grains.
Simple syrup	. . .	30 drops.
Dill water to	. . .	1 ounce.

One teaspoonful every three or four hours. In addition, local treatment in the form of ice, or evaporating lotions to the head and keeping the extremities and body warm must be carried out.

*As a sedative.* Potassium bromide will at times relieve neuralgia if the patient can rest, in which case it is best combined with chloral hydrate in doses of 15 to 20 grains of both. By painting the pharynx and soft palate with a strong solution it diminishes sensation



and has been used in cases of retching whilst taking impressions of the mouth, but cocaine is better.

**Dose.** 5 to 30 grains.

## POTASSA CAUSTICA

### POTASSIUM HYDROXIDE

**Formula.** KHO.

**Synonyms.** Caustic potash, potassium hydrate, fused potash.

**Source.** Prepared by the interaction of potassium carbonate with calcium hydroxide.

**Characters.** White sticks of a transparent colour, very deliquescent, corrosive and alkaline.

**Pharmacology.** It is a caustic and escharotic and when used as such great care is necessary on account of its deep penetrating action. It is never given internally, as it is a corrosive poison. As a caustic it has a deeper action than silver nitrate.

**General Therapeutics.** It is still occasionally used to open abscesses ; to arrest the sloughing of carbuncles and as an application to malignant growths, but care must be taken in its application on account of its deliquescent and penetrating properties.

**Dental Therapeutics.** It is used for polypi of the pulp and gums, though in the latter case it is better to have recourse to either the lancet or Paquelin's cautery (having previously applied novocain).

It is best used with a mixture of lime (equal parts), when it is known as *potassa cum calce*. The addition of the lime prevents to a great extent its deliquescent action. First dry the gum, then apply the paste and wait till it becomes jelly-like in appearance.

This should be removed and syringed. A second application may be necessary, but on no account should any of the applications be allowed to remain on the gum.

After removal of the growth no rough edges of enamel should be left at the cervical margin of the tooth, and the ultimate filling should not overlap, or the growth is liable to recur from irritation.

**Symptoms of Poisoning.** Mucous membranc of the mouth partly destroyed, heat and burning pain in mouth and stomach, purging, collapse.

**Antidotes.** Emetics, large draughts of water mixed with lemon-juice or vinegar, olive oil, stomach-tube, demulcent drinks.

## POTASSII CHLORAS

### POTASSIUM CHLORATE

**Formula.**  $\text{KClO}_3$ .

**Source.** Made by passing chlorine into water, holding lime or magnesia in suspension, and treating the clarified liquid with potassium chloride and crystallising.

**Characters.** Pearly white, hard crystalline plates, which have a cooling taste. Sparingly soluble in cold water. Explodes when rubbed with sulphur or sulphides. and a mixture of potassium chlorate, ferric chloride and glycerin has been known to explode if kept in a warm place (Murrell).

**Preparation.** Trochiscus potassii chloratis. Contains 3 grains in each.

**Pharmacology.** It is a refrigerant, alterative and diuretic. It has a double action on the salivary and buccal glands, viz., it checks or moderates their secretions if excessive, and stimulates or increases them if scanty.

The beneficial effects on the mouth and throat are due to its local antiseptic action.

**General and Oral Therapeutics.** Employed in some of the fevers, croup, tonsillitis, mercurial salivation and all inflammations of the oral cavity. The voice "tabloids" of Burroughs, Welcome and Co. and pastille (No. 38) of Allen and Hanbury are very efficacious in catarrhal conditions of the throat. They consist of potassium chlorate, borax and cocaine, the last-named drug allaying irritation.

In ulcerative stomatitis given both internally and as a mouth-wash, it acts as a specific, and the same can be said of it in tonsillitis, particularly when combined with ferric chloride tincture. In the latter case the following can be ordered :

Tincture of ferric chloride . . . . .	2 drachms.
Potassium chlorate . . . . .	80 grains.
Spirits of chloroform . . . . .	80 minims.
Glycerin . . . . .	3 drachms.
Water to . . . . .	8 ounces.

Two tablespoonfuls to be taken every four hours.

At the same time attention must be paid to the state of the bowels, constipation being avoided, and the throat well steamed with hot water.

In aphthous conditions of the mouth in young children it can be given in a mixture in doses of 3 to 5 grains, according to age, or applied locally with honey.

**Dose.** 5 to 15 grains.

## POTASSII IODIDUM

## POTASSIUM IODIDE

**Formula.** KI.

**Source.** Obtained by dissolving iodine in liquor potassæ and evaporating to dryness, mixing the residue with charcoal, fusing, dissolving and purifying.

**Characters.** Colourless, opaque, cubical crystals. Soluble in water, less so in spirit.

**Pharmacology.** It is an alterative, diuretic, sialogogue, expectorant and indirect antispasmodic. Its properties are similar to those of iodine, but it is less irritating. It occasionally produces headache, flushing of the face, gastric irritation, coryza, great depression, and in some cases salivation. The latter is more likely to ensue in those who have previously undergone treatment by mercury, which has accumulated in the system in the form of an insoluble albuminate, and which, on the administration of the iodide, has been set free. Small doses of this drug will at times bring on symptoms of "iodism," when larger ones will not.

**General and Oral Therapeutics.** It is of great service in the different forms of glandular enlargements, chronic skin affections, rheumatism, gout, etc. In the various tertiary forms of syphilis, such as nodes, ulcers and affections of the nervous system, potassium iodide is of the utmost value. It is a specific for actinomycosis; very large doses are given (20 grains three times daily). In chronic bronchitis, where the mucus is thick and tenacious and expectoration difficult, it acts beneficially by thinning the secretion. It is given in cases of lead poisoning to eliminate the drug from the system. If

the salt causes too much depression, sodium iodide can be given instead.

*As an alterative.* It is given internally in syphilitic ulcerations of the oral cavity, neuralgia due to the same cause, mercurial stomatitis, dental exostosis and chronic rheumatoid arthritis of the mandibular articulation. In all these cases it is best to begin with a dose of about 5 grains, which can be gradually increased.

Potassium iodide	.	.	.	40 grains.
Syrup of orange flower	.	.	.	1 drachm.
Spirit of chloroform	.	.	.	2 drachms.
Water to	.	.	.	8 ounces.

Two tablespoonfuls to be taken three or four times a day.

Should this cause much depression, aromatic spirits of ammonia can be added or the patient told to take alcohol in some form as a stimulant.

**Dose.** 5 to 20 grains or more.

## POTASSII PERMANGANAS

### POTASSIUM PERMANGANATE

**Formula.**  $K_2Mn_2O_8$ .

**Source.** Made by the interaction of manganese dioxide and potassium chlorate with a slight excess of caustic potash.

**Characters.** Dark purple prismatic crystals, soluble in water (1 in 20).

**Preparation.** *Liquor potassii permanganatis.*

**Pharmacology.** It is a disinfectant, deodorant, astringent and mild antiseptic; it is also a mild escharotic when applied in substance or strong solution. Its

disinfectant and antiseptic action is due to the liberation of oxygen. As a germicide its action is very weak, as it quickly gives up its oxygen to the organic substances in which bacteria flourish, and rapidly becomes inert.

**General and Oral Therapeutics.** It is sometimes used as a dressing for foul ulcers, to disinfect stools and foul discharges after removal from patient, to flush water-closets, etc. In the form of injection, lotion, or spray it is used to correct the fœtor of cancer, abscesses, ozœna, otorrhœa, ulcerated sore throat, etc. In ozœna a spray consisting of 5 minims of the solution and 5 grains of sodium chloride to an ounce of water, is very useful.

*As a deodorant and antiseptic.* It is a safe and efficient injection in diseases of the antrum, such as empyema, the patient being shown how to use the syringe after an opening has been made, and, when necessary, a small plate has been applied.

In all kinds of fœtid ulceration of the mouth it can safely be used as a mouth-wash. The strength of the solution varies, but it is safe to tell the patient to dissolve a grain in enough water to make it a pink colour.

It forms a good mouth-wash when used in a weak solution after ordinary cases of extraction, especially if there has been an alveolar abscess, or there is reason to believe a slight fracture of the alveolar border has happened. For dressing putrid pulps and canals other drugs are to be preferred.

**Dose.** 1 to 3 grains ; should be given only in water or pill made with kaolin.

## PYROZONE

**Synonym.** Ozonic ether.

**Source.** It is a solution of about 1·2 per cent. by weight of hydrogen peroxide in ether (*i.e.* four volumes approximately).

**Characters.** It is soluble in water in all proportions up to three times its volume, and possesses properties like hydrogen peroxide, but is more stable.

**Dental Therapeutics.** Its chief use is for the purpose of bleaching dead teeth. The rubber dam must be applied, and after the cavity and canal have been prepared and the apical foramen sealed with gutta-percha, the pyrozone can be applied on a pledget of cotton-wool and volatilised with the hot-air syringe. Continue this for a quarter of an hour and seal in with gutta-percha or calxine for two or three days.

## SAPO DURUS

## HARD SOAP

**Synonym.** Sodium oleate.

**Source.** Made with olive oil and sodium hydroxide.

**Pharmacology and Therapeutics.** It is an antacid and cleansing agent. Used in a powdered form in dentifrices. The following forms a nice tooth powder for those who like a saponaceous combination :

Precipitated chalk	.	.	.	2 ounces.
Light magnesia	.	.	.	$\frac{1}{2}$ ounce.
Powdered white soap	.	.	.	2 drachms.
Orris root powder	.	.	.	2 „
Oil of cloves	.	.	.	4 drops.



Medicated soaps are made containing such drugs as carbolie acid, formaldehyde, tar, sulphur, iethyol, lysoform, etc., as surgical detergents prior to an operation. There are also liquid soaps used for the same purpose, one of the best being "sterilla."

**Dose.** 5 to 15 grains in pill.

## SODIUM COMPOUNDS

The compounds used in dentistry are the biborate bicarbonate, ethylate, peroxide, phenate and sulphite.

### SODII BICARBONAS

#### SODIUM BICARBONATE

**Formula.**  $\text{NaHCO}_3$ .

**Source.** Prepared by saturating the sodium carbonate with carbonic acid gas.

**Characters.** A white powder with an alkaline taste and reaction. Feebly soluble in water.

**Pharmacology.** It is an antacid, its action being similar to that of the potassium bicarbonate, but it is less irritating. It is one of the antidotes to the mineral acids.

**General Therapeutics.** It is given internally in the different forms of dyspepsia, either before or after meals, according to the symptoms, and is used externally in certain skin diseases as well as for burns and scalds of the first degree.

Combined with other drugs, such as rhubarb, it is given internally to children in the different aphthous conditions of the mouth.



**Dental Therapeutics.** *As an antacid.* It frequently relieves toothache of the temporary teeth, when the patient is too young to have them extracted or stopped, by dropping a little into the cavity and rubbing some gently on the gum. In incipient cases of erosion an alkaline and antiseptic mouth-wash like the following should be ordered :

Sodium bicarbonate . . . . .	2 drachms.
Listerine . . . . .	1 ounce.
Water to . . . . .	10 ounces.

To be used as a mouth-wash.

In cases where the clasp of a denture is irritating the neck of a tooth the patient should be directed to rub the latter with a little sodium bicarbonate two or three times a week, and also brush the *inside* of the clasp with the same.

It is used as an ingredient of tooth-powders, but the author prefers the light magnesium carbonate, as it is not so heavy.

Like the potassium salt, it is used as a mouth-wash to neutralise the effect of any of the mineral acids whilst they are being taken.

**Dose.** 5 to 30 grains.

## LIQUOR SODII ETHYLATIS

### SOLUTION OF SODIUM ETHYLATE

**Formula.**  $C_2H_5ONa$ .

**Source.** Prepared by dissolving 22 grains of pure metallic sodium in 1 ounce of absolute alcohol.

**Characters.** A clear syrupy fluid, which becomes

brown through keeping. Fresh solutions should be made.

**Pharmacology.** It is a powerful and almost painless caustic, with antiseptic properties.

**General and Oral Therapeutics.** Used locally as a caustic for nævi, warts, lupus and other growths. In dentistry to destroy polypi of the gum.

## SODII PEROXIDUM

### SODIUM PEROXIDE

**Formula.**  $\text{Na}_2\text{O}_2$ .

**Synonym.** Sodium dioxide.

**Source.** It can be prepared by placing metallic sodium in slices on aluminium trays in an iron tube through which is passing a current of air freed from moisture and carbon dioxide, the temperature of the tube being kept about  $400^\circ$ .

**Characters.** It is a white amorphous powder which is strongly alkaline, deliquescent and caustic. Very soluble in water, dissolving with a hissing noise, an evolution of heat and the formation of sodium hydroxide and hydrogen peroxide. On application of heat it becomes yellow, then melts, but not so easily as sodium hydroxide, and does not decompose. On cooling it becomes white again. It should be kept in a dark bottle and away from the light. In making solutions the drug should be added in small quantities and the solution kept cool. A mixture of glycerin, water and sodium peroxide may cause an explosion, and the same may occur if carbolic acid is mixed with it and the mixture heated.

**Pharmacology.** It is an antiseptic, disinfectant, bleaching agent, solvent of fatty matters and caustic. Its value as an antiseptic and bleaching agent is due to the liberation of oxygen, and as a solvent to the formation of sodium hydroxide.

**Dental Therapeutics.** *As an antiseptic.* It is one of the most effective drugs that can be used for producing rapid sterilisation of root canals. The rubber dam must be first applied, not merely for the purpose of keeping the cavity dry, but more particularly for preventing the drug from coming in contact with the soft tissues. After clearing the cavity and opening up the canals the powder should be pumped up on a brooch which has previously been dipped in alcohol. Effervescence takes place, the loose atom of oxygen acting as a germicide, whilst the sodium hydroxide formed saponifies the contents of both cavity and canals. These should then be syringed with warm water and afterwards a drop of acetic acid (30 per cent.), or sulphuric acid (10 per cent.) inserted to neutralise the remaining alkali.

The whole should then be thoroughly dehydrated, the apex sealed and the canals filled either permanently or, to be on the safe side, temporarily, and on a second visit, if everything is in a satisfactory state the canals and cavity can be permanently filled. Should there be a chronic abscess, treat as before with sodium peroxide, but before sealing the apex, pump through some antiseptic, such as carbolic acid or hydrogen peroxide, and the abscess can afterwards be treated *via* the sinus.

Dr. E. C. Kirk recommends its use in the form of a saturated solution (this has to be very carefully made)

applying it with asbestos fibre in the place of cotton-wool, as the cotton is rapidly disintegrated by strong solutions.

*As a bleaching agent.* First apply the rubber dam, and after the usual preliminary steps of removing carious dentine, etc., the cavity should be well swabbed with a 50 per cent. solution and left in for 10 minutes; afterwards the cavity can be washed with a little warm water or a drop of dilute hydrochloric acid can be introduced to neutralise the alkali. Two or three dressings may be required, and the tooth should be filled with a light-coloured osteo for a time.

## SODÆ PHENAS

(NOT OFFICAL)

SODA PHENATE

**Formula.**  $\text{NaC}_6\text{H}_5\text{O}$ .

**Synonyms.** Sodium carbolate, phénol sodique.

**Source.** By mixing sodium hydroxide with carbolic acid and a small quantity of water, evaporating and converting by heat into a fluid of an oily consistence.

**Characters.** It is obtained as a saponaceous mass of acicular crystals of a lightish pink colour, which are freely soluble in water, creosote and carbolic acid.

**Pharmacology.** It is a hæmostatic, antiseptic, astringent disinfectant and anodyne.

**General Therapeutics.** Externally it is used as a styptic in cases of hæmorrhage, as a dressing for burns and wounds, and as a disinfectant application in throat affections and ozæna.

**Dental Therapeutics.** *As a hæmostatic and astringent.* It can be used for hæmorrhage after tooth extraction.

It should, however, not be depended on in severe cases, but rather in those where there is a general oozing and where a styptic *mouth-wash* only is needed and not plugging. For soft and spongy gums it can be diluted with 1 to 20 parts of water and the patient directed to rinse out the mouth several times a day.

*As an antiseptic and disinfectant.* It can safely be employed, diluted as above, in the various aphthous conditions of the mouth. For offensive breath, order a solution in the strength of 2 drachms to 8 ounces of water as a mouth-wash; at the same time attention must be paid to the cause, such as polypus of the gum, suppuration of the pulp, pyorrhœa, etc., which should be removed.

*As an anodyne.* It is useful in relieving the pain which often exists after a tooth or teeth have been extracted. In such cases, apply a little diluted on some cotton-wool to the painful spot; the patient will at first complain of some burning, smarting pain, which is, however, followed by relief.

## SODII SULPHIS

### SODIUM SULPHITE

**Formula.**  $\text{Na}_2\text{SO}_3 \cdot 7\text{H}_2\text{O}$ .

**Source.** Made by saturating a solution of sodium carbonate with sulphurous acid gas.

**Characters.** Colourless transparent prisms, inodorous, saline taste, feebly alkaline. Soluble in water and spirit. Should be kept in well-stoppered bottles, as it changes on exposure into sodium sulphate.

**Pharmacology.** It is a disinfectant, parasiticide and bleaching agent.

**Dental Therapeutics.** *As a disinfectant and parasiticide.* It is used as an application, combined with glycerin in the following proportions, for aphthæ of the mucous membrane due to zymotic conditions :

Sodium sulphite	.	.	.	2 drachms.
Glycerin	.	.	.	$\frac{1}{2}$ ounce.
Water to	.	.	.	2 ounces.

With a camel's-hair brush carefully smear the white patches every two or three hours.

*As a bleaching agent* (see Acidum Boricum, page 55).

**Dose.** 5 to 20 grains.

## ZINC COMPOUNDS

The compounds used in dentistry are the chloride, oxide and sulphate.

### ZINCI CHLORIDUM

#### ZINC CHLORIDE

**Formula.**  $\text{ZnCl}_2$ .

**Source.** Obtained by the action of hydrochloric acid on granulated zinc.

**Characters.** Colourless pencils or tablets, very deliquescent and caustic. Soluble in water, ether and alcohol. On account of its deliquescence it should be kept in well-stoppered bottles.

**Preparation.** Liquor zinci chloridi (Burnett's fluid).

**Pharmacology.** It is a powerful and penetrating escharotic, antiseptic, disinfectant, astringent, hæmodynamic, obtundent of sensitive dentine and coagulant. Its escharotic effect is due to its affinity for water and



its power of coagulating albuminous material. It penetrates deeply into the tissues and causes severe burning pain. The eschar produced separates in five to six days.

As an obtundent of sensitive dentine its power is due not only to its coagulating properties, but also to the fact that it penetrates the dentinal tubes.

It should never be given internally on account of its irritant effects.

**General Therapeutics.** Made into a paste with flour or plaster of Paris, to prevent its escharotic action extending too deeply, it is used to destroy lupus, rodent ulcer, morbid growths, gangrenous parts, warts and nævi.

**Dental Therapeutics.** *As an escharotic and obtundent.* These two actions have been classed together, as the obtunding effect of zinc chloride is dependent on its escharotic action. For the relief of sensitive dentine, it should be used as follows: apply the rubber dam, thoroughly dry the cavity with cotton-wool or bibulous paper and hot-air syringe, place a small piece of the chloride in the cavity and allow it to remain a few minutes. Great pain, as a rule, follows the application; but this may be modified by either having previously swabbed out the cavity with aconite tincture or by using cocaine. The extreme pain will, however, gradually disappear, and the excavation of the cavity can be proceeded with. After removal of some of the dentine pain is again felt, when another application must be made. It is an important matter that in all cases of sensitive dentine, whatever drug be applied for its relief, *sharp* instruments must be used. Also that cutting in one direction gives pain, in another the



reverse. In cervical cavities in the front of the mouth, where silver nitrate is not applicable, it is most serviceable by occasionally touching the cavity with the crystal before proceeding to excavate.

It should never be used as an obtundent when the sensitive dentine is near the pulp, as it will set up irritation of that organ.

It can be applied to granulations arising from necrosis after extractions, and to those which occur at times after the removal of an epulis. In the latter case some authorities say it should not be applied, as it is liable to cause irritation and a recurrence of the growth.

*As a hæmostatic.* It may be used to stop alveolar hæmorrhage, but is in no way superior to adrenalin or ferric chloride.

*As an astringent and disinfectant.* In a dilute form it is used as an injection in chronic alveolar abscess, empyema of the antrum, and ranula. Also as a mouth-wash after removal of an epulis in the strength of 3 grains to 1 ounce of water.

**Symptoms of Poisoning.** Corrosion of lips and mouth, burning pain, blood-stained vomiting with shreds of mucous membrane, purging.

**Antidotes.** Wash out stomach or give emetics and then demulcents.

**Other Dental Uses.** It is one of the ingredients of the osteoplastic fillings. (See page 127.) It is used as a flux in soft soldering.

## ZINCI OXIDUM

## ZINC OXIDE

**Formula.**  $\text{ZnO}$ .

**Source.** Made by heating the zinc carbonate till the whole of the carbonic acid and water are expelled.

**Characters.** A whitish powder, odourless and tasteless. Insoluble in water.

**Preparation.** Unguentum zinci.

**Pharmacology.** Applied locally it is a sedative and absorbent; in the treatment of the dental pulp it is a conservative agent. Given internally it is a non-irritant astringent, nervine tonic and antispasmodic.

**General Therapeutics.** Given in cases of chorea, epilepsy, neuralgia, the night sweats of phthisis, hysteria, and whooping-cough. Externally it is applied to excoriated surfaces, herpes, etc., either in dry powder mixed with starch, or as an ointment. It is given in infantile convulsions due to teething in doses of  $\frac{1}{2}$  to 5 grains with a little sugar.

**Dental Therapeutics.** *As a conservative agent.* The late Mr. R. H. Woodhouse recommended it in combination with carbolic acid and eau-de-Cologne in the form of a thin paste in badly decayed teeth of children where the pulp is not exposed but has only a thin layer of softened dentine over it; also in the teeth of adults, where exposure has taken place but the pulp is healthy and warrants conservative treatment. In advocating this he pointed out the advisability of absolute isolation from the fluids of the mouth to prevent the progress of decalcification. He left the preparation in for a week or so, when the tooth could

be more carefully excavated and filled with Sullivan's cement or osteo. Mr. Woodhouse also used the same preparation for root fillings.

**Other Dental Uses.** It is one of the ingredients of the *powdered* portion of the osteoplastic fillings (see pages 127-8).

**Dose.** 3 to 10 grains.

## ZINCI SULPHAS

### ZINC SULPHATE

**Formula.**  $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ .

**Synonym.** White vitriol.

**Source.** Obtained by the inter-action of sulphuric acid on granulated zinc.

**Characters.** Colourless crystals resembling magnesium sulphate, with a metallic styptic taste. Soluble in water, insoluble in alcohol.

**Pharmacology.** It is a tonic, astringent, anti-spasmodic and prompt and safe emetic.

**General and Oral Therapeutics.** One of its chief uses is as an emetic in narcotic and other poisonings. It should be given in warm water in doses of 10 to 20 grains, the latter for preference. Its advantage for this purpose over ipecacuanha and antimony is that it causes less nausea and after-depression. The following forms a good emetic (Murrell) :

Sulphate of zinc . . . 30 grains.

Powdered ipecacuanha . . . 50 „

To be taken in water.

In severe cases of quinsy that mixture can be given,

the emesis produced thereby frequently causing the abscess to burst, and so saving lancing.

As an antispasmodic it is employed in cases of epilepsy, chorea, hysteria, etc., but is in no way superior to the oxide.

It is used externally as an astringent for relaxed and discharging mucous surfaces, and as an injection in the strength of 10 grains to 1 ounce for empyema of the antrum.

*As a local stimulant and astringent.* It is employed in cancrum oris and ulcerations of the mucous membrane of the mouth. In such cases a mixture of 20 grains of the sulphate to 1 ounce of honey can be applied with a camel's-hair brush, or a mouth-wash of the strength of 3 grains to an ounce of water can be used.

**Other Dental Uses.** It is an ingredient of the *powdered* portion of the oxysulphate fillings (see page 128).

**Dose.** 1 to 3 grains as a tonic, 10 to 30 grains as an emetic.

## THE OSTEOPLASTIC FILLINGS

There are three varieties, viz. the oxychloride, the oxyphosphate and the oxysulphate, the chief ingredient of the *powdered* portion of each being zinc oxide which has been heated for two hours and then finely pulverised. (For Silicate Cements, see page 131.)

**I. The Oxychloride.** *Composition.* The powder consists of zinc oxide with or without a little sodium biborate and silica, whilst the liquid portion is a solution of zinc chloride.

*Characters and Uses.* It readily imbibes moisture from the atmosphere, and therefore should be kept

well stoppered. It sets slowly and acts as an irritant if placed too near the pulp. It is also an antiseptic.

Its chief uses are for filling the roots of teeth, as an obtundent of sensitive dentine (providing it is not placed near the pulp), and for filling cavities which have been bleached. As a root filling it must be mixed very thin and carried up with some filaments of cotton-wool on a Donaldson bristle.

It is quickly acted upon by the fluids of the mouth, especially at cervical margins, and is classed under the heading of temporary fillings.

**II. The Oxyphosphate.** *Composition.* The powder is zinc oxide, and the liquid portion one of the varieties of phosphoric acid.

*Characters and Uses.* It is more durable than the oxyehloride and is not so irritating. It is used in cavities in front of the mouth where the walls are thin and in which gold is contra-indicated, or, if a gold filling is required, it can be used to line the walls to strengthen them. In the teeth of young children who cannot, or will not, undergo the preparation required for a metallic filling, it is useful on account of its quicker adaptability. In sensitive cavities, where it would be unwise to insert a metal filling, an oxyphosphate can be used and left in for three or six months as an obtundent. It is also best for fixing in inlays.

**III. The Oxysulphate.** *Composition.* The powder of this is composed of calcined zinc sulphate and zinc oxide, and the fluid portion is a solution of gum arabic to which a small quantity of calcium sulphide is added and the whole filtered.

*Characters and Uses.* This is a non-irritating preparation and can be applied to cavities as a flooring

when very near the pulp. Also as a temporary stopping for a few weeks in those cases where the dentine is so acutely sensitive that its removal cannot be borne.

It is used as a material for fixing a cap over an exposed pulp, and can be applied in a very liquid form over an exposure. In the latter case the cavity should be first gently mopped out with an antiseptic, or an antiseptic which will not interfere with the hardening can be mixed with the oxysulphate and a small quantity about the size of a pin's head should be dropped near the exposure, where it will spread itself out and form an effective cap.

*General Remarks on the Osteoplastics.* There are many varieties sold, and each one has its virtues. Most of them are put up in various shades to enable the operator to match the colour of the front teeth. They should never be inserted as permanent stoppings, their duration as a rule being about two years, though some last much longer. In the majority of cases the rubber dam should be applied to exclude all moisture; when working the osteo into its place lubricating the instruments with some substance such as vaseline will prevent any adherence. They are sometimes used in combination with amalgam in saucer-shaped cavities where it is difficult to obtain any retaining pits. For this purpose the amalgam is first mixed very dry, all excess of mercury being thoroughly squeezed out. The osteo, preferably the oxyphosphate, is then mixed thinner than usual and the two carefully mixed with a firm spatula, and the filling inserted in the ordinary way. Another method is as follows: first get the amalgam mixed ready for filling, then place an osteoplastic round the walls of the cavity, being careful to



see none is near the edges, and before it has time to set, insert the amalgam. It is asserted that by this method the amalgam cannot shrink. Osteoplasties are useful for starting gold fillings in deep cavities by placing some strips or pellets of cohesive gold into the osteo before it has set.

They are also used to fix the different kinds of crowns to the roots of teeth, and, as an emergency, to hold an artificial tooth in, which has been broken away from a vulcanite plate, should there be no time to vulcanise it properly.

### THE BLACK CEMENTS

*Composition.* The powder of these consists of oxyphosphate of copper with more or less cobalt, whilst the liquid portion is phosphoric acid.

**Characters and Uses.** They are supposed to have a special effect in hardening softened dentine, but it is questionable if they are superior in this respect to a good oxyphosphate of zinc. In any case, care must be taken to see that the cavity is dry and that no moisture gets to the filling until it is quite set. Their durability in permanent teeth is uncertain; in some mouths they last a considerable time, due perhaps to the fact that cobalt is largely if not entirely used in the making, at other times they quickly wear away or dissolve.

### CALXINE

This is a temporary cement which has been introduced to take the place of gutta-percha in certain cases; it seems a kind of Portland cement. The following advantages are claimed for it:



(1) It can be mixed so thinly that it will drop off the spatula without pressure.

(2) It sets quickly.

(3) It sets hard enough to resist attrition, at the same time it can easily be removed with a sharp excavator.

(4) It is a non-conductor.

(5) It effectually seals any drugs that may be used in treating the tooth.

No attempt should be made to contour until it has become set, when it can be cut and trimmed quite easily.

As a temporary stopping to secure "dressings" in a cavity it is far superior to gutta-percha, as in pressing in the last-named, the medicament used is liable to be squeezed out. It is far and away the best temporary filling we have, not only on account of its easy application, but also of its equally easy removal, which is greatly to be desired where the tooth is tender to the touch. It is sold in two colours, pink and white, to indicate the presence or absence of a devitalising agent. It is hydraulic to a high degree and sets directly it is covered with saliva.

## THE SILICATE CEMENTS

These cements are, comparatively speaking, an entirely new departure in filling materials, in the fact that after careful insertion into the cavity they set with a translucent appearance which resembles that of the natural teeth. This is due to the powder containing silicates (principally those of aluminium and calcium) and the subsequent action of the phosphoric acid and of the water contained in the liquid.

Proper details of their composition it is, however, impossible to give, as the various manufacturers naturally guard with great jealousy the materials and their quantities used in making both powders and liquids.

Turning to the subject of their characters and uses it is necessary to be very guarded in any statement of opinion. For many years experiments have been continually carried on by numbers of scientific men who have devoted their time in trying to put a perfect translucent cement before the profession, and after the introduction of Aseher's cement many others quickly appeared with varying degrees of success. These cements generally have shown various faults, the chief of which are :

(1) Variation, (2) poor translucency (especially after some time in the mouth), (3) discoloration, (4) action on the pulp. Explanations have been put forward to account for these faults, and lengthy instructions have been written showing how they may be avoided, the several makers naturally claiming their own cements as the best.

Variation is often due to the amount of care taken by the operator in the mixing of the cement, also to the minuteness with which he follows out the instructions for using. The temperature of the glass slab—and, indeed, of the room—greatly affect the “mix,” and the cement powders themselves in some cases vary in their consistency.

Poor translucency and discoloration may also be due to defects in manipulation, such as lack of cleanliness, using of steel instruments, etc., or the presence in the powder of traces of iron; too frequently it is due to the fact that one of the materials used in the

powder offers less resistance to the fluids of the mouth than the rest. This results in that amount dissolving away, leaving the filling apparently as before, but in reality when examined microscopically it is full of minute spaces into which the colouring-matter of the food filtrates, thus causing the discoloration so often met with some few weeks after the filling is inserted.

The action on the pulp may be due to traces of arsenic; to the remaining excessive acidity of some of the cements when inserted, or to the fact that the filling has been placed too near the pulp, permitting an easy transmission of thermal changes.

Among the most prominent cements are Ascher's, Astral, Harvardid, Schoenbecks and De Trey's, but time is required to test them for durability and for other qualities claimed. The latest we have is that known as De Trey's Synthetic Cement. This seems a great advance on its predecessors, and if its lasting properties are all that are claimed for it, we seem to have at last found a translucent cement that is very near to being perfect.

De Trey's Cement is made from materials which are a synthetic reconstruction of several minerals such as triolith, opal, topaz, ruby, etc. In this way, by the using of chemically pure raw material in the reconstruction, such deleterious matters as arsenic or traces of iron, etc., are entirely absent, which is often not the case in the natural minerals; also in the selecting of the raw materials great care has been taken, after years of experimenting, to exclude any substance that shows less resistance to the action of the fluids of the mouth, than does the main bulk of the filling. Further,

De Trey's rely almost entirely for the chemical reaction in their cement on hydration, there being no trace of acidity one hour after the mix.

In the filling of interstitial and mesial cavities of the front teeth, of course, lies the chief field of utility for these cements; it must, however, be borne in mind that it is necessary to have a retentive-shaped cavity, and also that as they transmit thermal changes more readily than the so-called osteoplastics, they should not be inserted too near the pulp.

Finally, when using the translucent cements it is of paramount importance that the instructions given should be followed out with the greatest care and minuteness. Too much stress cannot be made of the fact that absolute cleanliness, methodical mixing and entire absence of moisture from the cavity are essentials in the obtaining of successful results.

# SYNTHETICAL COMPOUNDS



## SYNTHETICAL COMPOUNDS

### ACETOZONE

(NOT OFFICIAL)

**Formula.**  $\text{C}_6\text{H}_5\text{CO}_2\text{O}_2\text{COCH}_3$ .

**Source.** It is a mixture of benzoyl-acetyl-peroxide with its own weight of infusorial earth.

**Characters.** It is a white crystalline powder which is sparingly soluble in distilled water, oils or alcohol. Where distilled water is not available ordinary water can be used after it has been boiled. Solutions may be made by shaking 10 grains in 20 ounces of water. It should be kept in a dry place, but should not be exposed to heat or allowed to come in contact with a heated body.

**Pharmacology.** It is a powerful non-toxic germicide, disinfectant and bleaching agent.

**General Therapeutics.** Used as an antiseptic to wounds (10 grains to one pint of water). After excision of the tonsils the parts can be syringed with the solution.

**Dental Therapeutics.** *As a germicide.* In cases of pyorrhœa after removal of tartar, pick up some of the powder on a piece of cotton-wool that has been wrapped round a probe and work it into the pockets. It is more effective where pus is actually present.



*As a bleaching agent.* It is advocated by some for this purpose on account of its penetrating action. After the usual preparation of the cavity and canals the powder slightly moistened should be sealed in the cavity with calxine and allowed to remain for twenty-four to forty-eight hours, or even longer if there is bad staining.

## ACIDUM CARBOLICUM

### CARBOLIC ACID

**Formula.**  $C_6H_5OH$ .

**Synonyms.** Phenic acid, phenol, phenyl alcohol.

**Source.** It is obtained from coal-tar oil by fractional distillation and subsequent purification.

**Characters.** When pure it is seen in the form of colourless acicular crystals, which at  $91.5^{\circ}$  F. become an oily fluid, possessing a strong odour and a burning taste. It is only slightly soluble in water, freely so in alcohol, ether and glycerin.

**Preparations.** Acidum carbolicum liquefactum (liquefied phenol), phenol 10, water 1, glycerinum acidi carbolic (1 fluid drachm contains 12 grains), trochiscus acidi carbolic (each lozenge contains 1 grain with a tolu basis). Also the ointment and suppository.

**Pharmacology.** It is a powerful antiseptic, germicide, deodorant, disinfectant, sialogogue, hæmostatic, obtundent, coagulant, rubefacient, escharotic, local stimulant. local anæsthetic and irritant poison. Administered internally it is a sedative and carminative (by virtue of its antiseptic properties), and possesses the power of allaying vomiting and gastric irritability. It resembles creosote in many of its characters and medicinal pro-

perties. Lord Lister considered carbolic acid superior to all other agents as a most potent poison to all those low forms of animal life determining putrefaction.

As a local anæsthetic it exerts a very soothing influence on painful tissue. When applied to the skin or mucous membrane it produces a burning sensation which is of short duration, and a white patch afterwards appears which becomes brown or black.

**General Therapeutics.** It was formerly employed as a "spray" in the treatment of wounds and during operations, but is now discontinued as being unnecessary. It is used as a dressing for wounds in the form of gauze; as an antiseptic to cleanse instruments and to purify sponges and the hands of the operator. For these latter purposes a 5 per cent. solution should be used. It is employed as a mouth-wash for aphthous stomatitis (15 minims of the glycerinum to 1 ounce of water) and has been used for diphtheria.

As a stimulating lotion for relaxed conditions of the uvula and soft palate the following will be found most efficacious :

Carbolic acid	.	.	.	.	$\frac{1}{2}$ drachm.
Glycerin	.	.	.	.	1 ounce.
Water to	.	.	.	.	2 ounces.

To be painted twice a day over the relaxed parts.

**Dental Therapeutics.** *As an antiseptic.* In a diluted form (1 in 40), either with water or absolute alcohol, it is used for the treatment of dead teeth where there is no formation of pus. Coagulating albumen as it does, it would greatly interfere with the fluidity of pus, and hence increase the difficulty of its removal. An exception to this, however, is when there is a fistulous opening

on the gum. In these cases dilute carbolic acid pumped up or down the canal of the tooth till a white stain appears on the gum will, in the majority of cases, effectually cure a chronic alveolar abscess.

A solution of 1 in 40 can be used for syringing out an abscess or a septic socket.

It may also be used, in the diluted form, for swabbing out ordinary cavities before filling. In these cases it should be combined with absolute alcohol, which quickly evaporates and leaves the cavity dry.

When an antiseptic mouth-wash or tooth-powder is required carbolic acid can be safely prescribed in the following proportions :

*Mouth-Wash*

Carbolic acid . . . .	20 drops.
Glycerin . . . .	1 ounce.
Rose-water to . . . .	10 ounces.

*Tooth-Powder*

Precipitated chalk . . . .	3 ounces.
Orris root (powdered) . . . .	3 drachms.
Carbonate of magnesium . . . .	4 „
Carbolic acid . . . .	30 drops.

The following prescription makes a very useful and refreshing mouth-wash for use in the surgery :

Carbolic acid . . . .	7 drachms.
Liquor potassæ . . . .	7 „
Chloroform . . . .	20 drops.
Eau de Cologne . . . .	12 drachms.
Liq. cocci . . . .	1 drachm.
Rose-water to . . . .	20 ounces.

A teaspoonful or so in half a tumbler of warm water.

*As an escharotic.* Applied to an ulcerated exposed pulp the strong acid (from its escharotic properties) forms an eschar, which has been thought to be conducive to the recovery of that organ. The solution should not, however, be used stronger than 1 in 20, for it would act as an irritant, destroy the layer of odontoblasts, and so prevent the formation of secondary dentine, the presence of which is absolutely necessary if the pulp is to be preserved.

In cases of devitalisation of the pulp with arsenic it will be frequently found that a small portion of the pulp at the end of a canal is still alive. As it would be unwise to again apply arsenic so near the apical foramen an application of carbolic acid will usually complete the devitalisation.

*As an anodyne.* In a dilute form it can be applied to the gums, after extraction of teeth, to deaden the pain which follows the operation. It also allays the pain of sensitive dentine, which it does by coagulating the contents and sealing up the ends of the dental tubes. For this purpose it should not be used with glycerin, as this latter drug would intensify the pain.

*As a local stimulant.* In combination with glycerin (1 in 40) it may be used to increase the secretion of the palate for the purpose of retaining suction plates, which it does by stimulating the action of the mucous follicles. The solution should be painted on the gums and palate with a camel's-hair brush.

After the removal of tartar the edges of the inflamed gums will be greatly improved by the use of a 1 in 20 solution locally.

*As a styptic.* In slight cases of hæmorrhage after

tooth extraction, or when the gum has been accidentally injured when stopping, a pledget of cotton-wool should be dipped in a strong solution and applied carefully to the spot where the oozing is taking place; the *rational* of its action being that it coagulates the albumen at the mouth of the bleeding vessel, and so forms an effectual plug.

**Doses.** 1 to 3 grains as a pill; of acidum carbolicum liquefactum 1 to 3 minims largely diluted.

**Symptoms of Poisoning.** Intense burning sensation from lips to stomach; lips and mouth white; odour of carbolic. Insensibility, stertorous breathing, collapse.

**Antidotes.** Olive oil, white of egg, emetics, stimulants, and the sulphates, such as sodium sulphate or magnesium sulphate; the two last-named form sulphocarbolates, which are harmless. The application of olive oil will greatly lessen its caustic effects should a strong solution drop in the mouth or on the lips or cheeks of a patient.

## ADRENALIN

(NOT OFFICIAL)

**Formula.**  $C_9H_{13}O_3N$ .

**Source.** It is the active principle of the supra-renal capsules of sheep.

**Characters.** It is seen in the form of grey crystals, which are soluble in hydrochloric acid and boric acid solution, also soluble in alkalies, but should the latter be in excess, decomposition will occur. Insoluble in alcohol, ether and chloroform. There are many commercial forms of adrenalin, the best being the chloride solution, "Takamine."

**Pharmacology.** It is a most efficient hæmostatic, as it constricts the small arteries by direct action on their walls and so raises the blood pressure, inhibits the heart through the vagus, slowing and strengthening the beat. It is also said to have anodyne properties. It was with the discovery of adrenalin that local anæsthesia became of clinical importance.

**General Therapeutics.** It is used to restrain hæmorrhages of all kinds, both when given internally or applied locally. It is largely employed as an *adjuvant* to the various local anæsthetics used in general and dental surgery.

**Dental Therapeutics.** *As a hæmostatic.* The adrenalin chloride solution, 1 in 1000, is a most efficient hæmostatic for all the different kinds of hæmorrhage that occur in dental surgery. In cases of alveolar hæmorrhage the socket or sockets can be carefully plugged with pledgets of cotton-wool dipped in the solution, after the usual preliminary steps have been taken, such as removal of clots, etc., and followed by the ordinary routine treatment, such as pressure, etc. But a very convenient way of using the drug for this purpose is to pack in the adrenalin gauze tape of Parke, Davis and Co., which forms a good sterilised plug. Its use is not advocated in cases of hæmophilia.

Combined with such drugs as cocaine, eucaine, novocain, alypin, etc., it is used in pressure and local anæsthesia (see pages 249, 251). With these it increases and prolongs the analgesic effect of these drugs and at the same time limits their toxic action, this being due to the diffusion of the anæsthetic being retarded by the ischæmia caused by the adrenalin.

In cases of polypus of the gum or pulp this drug can



always be applied, both before and after removal, to restrain hæmorrhage and allow the operator to proceed with the preparation of the cavity or crown at once. In cases, too, where the gum is slightly injured and blood is oozing it can be applied.

**Dose.** 5 to 30 minims of the solution, 1 in 1000.

## ÆTHER

### ETHER

**Formula.**  $(C_2H_5)_2O$ .

**Synonyms.** Ethyl oxide, sulphuric ether, ethyl ether.

**Source.** It is obtained by the interaction of ethylic alcohol with sulphuric acid.

**Characters.** It is a colourless volatile liquid with a strong odour and hot taste. Sp. gr. 0·735.

**Pharmacology.** It is a general and local anæsthetic, cardiac stimulant, sialogogue, vesicant (when rubbed in), antispasmodic and carminative.

**General Therapeutics.** It is a rapid stimulant in cases of syncope, shock or collapse. Given hypodermically for such a purpose it has saved many lives.

### Dental Therapeutics.

*As a solvent.* It can be used to remove greasy materials from carious cavities and pulp canals; but chloroform is preferable, as it has not such a pungent odour.

**Other Dental Uses.** It is used as a freezing agent when cutting sections in dental microscopy.

**Dose.** 10 to 30 minims for repeated administrations; 40 to 60 minims for single dose.

For a description of this drug as a general anæsthetic the reader is referred to books on this special subject.



## ÆTHYL CHLORIDUM

(NOT OFFICIAL)

ETHYL CHLORIDE

**Formula.**  $C_2H_5Cl$ .**Synonym.** Hydrochloric ether.**Source.** Prepared by the action of hydrochloric acid on absolute ethyl alcohol.**Description.** A colourless liquid with a sweetish burning taste. Its vapour is inflammable.**Pharmacology.** On account of its low boiling-point (about  $50^{\circ}$  F.) and the intense cold produced by evaporation it is used as a *local* anæsthetic. It is also used as a general anæsthetic for tooth extraction and minor operations.**Dental Therapeutics.** It is employed to relieve and in some cases prevent the pain of tooth extraction, and is sold for this purpose in glass bulbs terminating in a fine tube with a spring-capped point. The spray should be directed to the gum, which has been previously dried and freed from grease, on each side of the tooth to be extracted, and as soon as the gum becomes white the operation may be proceeded with. The author's experience with this drug is that it is useful for teeth with single roots, also for cutting away polypus of the gum and in those cases of buried roots where it is necessary to excise a portion of the gum, previous to extraction. In all cases, however, it certainly deadens the pain of insertion and penetration of the forceps; but its indiscriminate use as a *perfect* local anæsthetic for tooth extraction is unwise and likely to cause loss of confidence between patient and

dentist. It is advocated by some as an obtundent of sensitive dentine, but the application of the jet is more likely to cause increased pain at first. This may be obviated to a certain extent by inserting a cotton-wool pellet and allowing the jet to be directed on this first. In any case the obtunding effect is very brief and the excavation must be rapidly proceeded with. On account of its inflammable nature it should not be used near a lamp.

**Anestile** is a mixture of ethyl and methyl chloride, and acts in the same manner as the above ; it is supplied in screw-capped cylinders.

**Coryl** is a mixture of similar composition.

## AIROL

(NOT OFFICIAL)

**Source.** It is a gallate of bismuth subiodide.

**Characters.** It is a light greenish, tasteless, insoluble powder.

**Pharmacology.** The iodine is so combined that it is able to exert an extremely active antiseptic and deodorising action without causing irritation or toxic effects from its too rapid liberation.

**Dental Therapeutics.** The author has, with success used this drug in the treatment of dead teeth. It is particularly useful in those cases where the pulp cavity and canals are in a moist and foetid condition. In such cases it has a decided desiccative action in addition to its antiseptic properties.

It can be used dry (after excavating) on a little cotton-wool or mixed with a 1 in 2000 solution of mercuric chloride. If with the latter, care should be

taken and the rubber dam applied, as in one case in which this mixture was tried, some of it spread to the gum and severe inflammation followed. In those successful cases where the two drugs were used the presence of the perchloride discounted the presumed efficacy of the airol. When, however, the drug has been used by itself almost equally good results have been obtained; and after an application to a moist and foetid cavity, if properly sealed with gutta-percha, it will be found in a day or two to be in a dry aseptic condition. It will also be noticed that the powder has changed from a greyish to a yellowish colour and looks as though the cavity had been dressed with iodoform *minus* its odour.

## ALCOHOL ABSOLUTUM

### ABSOLUTE ALCOHOL

**Formula.**  $C_2H_5OH$ .

**Synonyms.** Ethyl hydroxide, ethylic alcohol.

**Source.** Prepared by extracting water from less strong ethylic alcohol and subsequent distillation.

**Characters.** It is a colourless limpid fluid with a sp. gr. of 0.794 to 0.7969; boils at 173.6° F.

**Pharmacology.** It is a diuretic, diaphoretic, stimulant, solvent, disinfectant, sialogogue, dehydrating agent and antiseptic. In the form of a lotion when diluted it is a refrigerant. It is also slightly anæsthetic in its action and is an obtundent of sensitive dentine. It has a great affinity for water, which it extracts from soft living tissues when it comes in contact with them. When taken undiluted into the mouth it has

a hot, painful, stimulating effect on the tongue and mucous membrane, forms with the secretions a thin layer of coagulated albumen, and the epithelium becomes whitened, whilst partial anæsthesia is produced.

**General Therapeutics.** It is given as a stimulant in the form of brandy or whisky in cases of syncope, hæmorrhage, and collapse. Also in certain cases of fever, chronic disease attended with debility, melancholia, hysteria, insomnia, etc. The advisability, or not, of giving this drug in these and other cases is too complex a question to be gone into in a work of this kind.

Cases of facial neuralgia have been cured by injections of alcohol down to the affected nerve, sometimes with cocaine, but more recently with novocain. In tic-douloureux, Purves Stewart employs a solution of beta-eucaine, 2 grains; absolute alcohol, 6 drachms, water to 1 ounce. Technique of the injection: a needle 10 cm. long and 1.5 mm. in diameter is used, with a blunt stiletto enclosed. The latter is used as soon as the needle is through the skin.

**Dental Therapeutics.** *As an obtundent and anodyne.* Absolute alcohol relieves the pain of sensitive dentine by coagulating the contents of the dentinal tubes. The cavity should be thoroughly well dried with bibulous paper and the hot-air syringe, and then swabbed out with alcohol.

In the form of brandy or whisky, if held in the mouth, it will often relieve the pain of an aching tooth. Its antiseptic properties may have as much to do in this matter as its anodyne properties.

*As an antiseptic.* It is a germicide, and hence assists the action of other drugs, such as mercuric chloride

and carbolic acid, in the treatment of dead teeth. It quickly evaporates and leaves the cavity and canals perfectly dry with the accompanying drug remaining. When injecting any local anæsthetic this drug can be used for cleansing the gum before inserting the needle.

*As a solvent.* It is used as a solvent for such drugs as carbolic acid, mercuric chloride, tannic and gallic acids, etc.

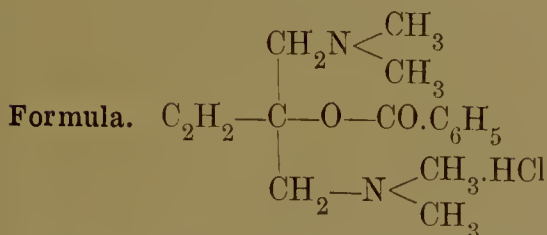
*As a stimulant.* It is given in the form of brandy or whisky in cases of syncope, after or during the administration of dental anæsthetics. It is also used as a local stimulant in cases of mercurial and other forms of stomatitis.

**Other Dental Uses.** It is used in dental microscopy as a *fixing* and *hardening* reagent, more particularly of pathological specimens. It penetrates well and preserves nuclei. It is also useful as a dehydrating agent.

**Antidotes.** Stomach-tube, emetics, strong coffee, the cold douche.

## ALYPIN

(NOT OFFICIAL)



**Source.** A derivative of glycerin. It is the hydrochloride of benzoyl-tetramethyl-diamino-ethyl-dimethyl-carbinol.

**Characters.** It is a white crystalline powder, easily soluble in water and alcohol. Solutions should be freshly prepared. It can be obtained in the form of tablets of various weights, the most useful for dental work being those known as "Alypinoids D" (registered), containing  $\frac{1}{3}$  grain of alypin with 2 minims of the boric salt of suprarenin 1 in 10,000. These are sterilised and packed in glass tubes. The solution with suprarenin turns pink after exposure to air.

**Pharmacology.** It is a local anæsthetic, spinal analgesic and anti-emetic. Its anæsthetic effects are equal to that of cocaine, whilst its toxic effects are considerably less. It has a neutral reaction and is not precipitated by alkaline fluids of the body, nor does it injure any of the tissues with which it comes in contact.

**General Therapeutics.** It is used in general surgery for infiltration, regional and lumbar anæsthesia, and a spray for operations on the nose, pharynx, and ear.

**Dental Therapeutics.** For the painless extraction of teeth this drug compares very favourably with any other of a similar nature, and the procedure for injecting is practically the same. (See Local Anæsthesia, page 249.)

It is advisable to use fresh solutions, especially when combinations with suprarenal preparations are resorted to, because, as is known, the latter only keep for a certain time.

For ordinary anæsthesia of the mucous membrane (paintings) it will be unnecessary in most cases to specially sterilise the solutions, because alypinoids are heated to 100° C. for several hours before being sent out, and may therefore be regarded as free from pathogenic organisms.



In order to prepare perfectly sterile solutions of alypin the following method should be adopted :

The water required for the solution is boiled for ten minutes in a small glass tube closed with a plug of wool; the alypin is then added, and the solution kept boiling for another minute. The proper quantity of suprarenal extract is added just before the operation, but it is much better to use the alypinoids. The following combination has been found very satisfactory :

Alypinoids D . . . . .	1 tablet.
Distilled water . . . . .	15 minims.
Listerine . . . . .	2 „
<b>Dose.</b> $\frac{1}{20}$ to $\frac{1}{2}$ grain.	

## AMYL NITRIS

### AMYL NITRITE

**Formula.**  $C_5H_{11}NO_2$ .

**Source.** It is produced by the interaction of nitrous acid with amylic alcohol that has been distilled between  $262^\circ$  and  $270^\circ$  F.

**Characters.** It is an ethereal liquid of a yellowish colour and a peculiar odour. Freely soluble in rectified spirit, ether and chloroform; insoluble in water. Should be kept cool; exposure to air renders it comparatively inert.

**Pharmacology.** It is an anodyne, antispasmodic, restorative and antidote. When inhaled it causes increased action of the heart, increasing the pulse in from 3 to 10 seconds, producing a sense of fulness and throbbing in the head, flushing of the face, visible pulsation of the carotids and a sense of oppression on



the chest. Its specific action is confined almost to the circulatory system. It causes dilatation of the peripheral vessels by relaxing their muscular coats, at the same time the heart's action is greatly accelerated with but little if any increase of its force.

**General and Dental Therapeutics.** It is given for angina pectoris, asthma, sea-sickness and syncope. Cases are reported where the inhalation has arrested hæmorrhage from various parts of the body, especially hæmoptysis.

Its chief use is for the relief of syncope during or after the administration of anæsthetics. For this purpose capsules are made which contain 2 to 5 minims of the drug and are wrapped up in lint. These capsules can in case of emergency be broken with the fingers, placed in a handkerchief and applied to the nostrils.

Martindale's capsules are enclosed in cotton-wool and silk and when the capsule is broken the liquid soaks these articles and the drug can be inhaled conveniently. They do not deteriorate by keeping. They should always be placed handy whenever an anæsthetic is given. It is one of the antidotes for cocaine poisoning.

*As an antispasmodic and anodyne.* In neuralgia of the fifth nerve it frequently relieves pain by an inhalation of 3 minims.

**Dose.** 2 to 5 minims cautiously inhaled from a serviette or handkerchief in which the glass capsule has been crushed. Should Martindale's capsules be used, no serviette is required, as they cannot injure the fingers. Rarely given internally; if so, the dose is  $\frac{1}{2}$  to 1 minim.

**Antidotes.** Stomach-tube, emetics, fresh air, the recumbent position, artificial respiration. There is no case of poisoning by amyl nitrite on record.

## ANTIPHLOGISTINE

(NOT OFFICIAL)

**Source.** It is composed of anhydrous and levigated argillaceous mineral, chemically pure glycerin, compounds of iodine, minute quantities of boric and salicylic acids and the oils of eucalyptus, gaultheria and peppermint.

**Characters.** It is a hygroscopic mass which keeps in any climate and is always ready for use.

**Pharmacology.** It is a counter-irritant with antiseptic and anodyne properties. It stimulates the cutaneous reflexes and causes a dilation of the superficial and, coincidently, a contraction of the deep-seated blood-vessels, thus flushing the superficial capillaries.

**General and Dental Therapeutics.** Its chief use is as a non-irritating antiseptic poultice in all kinds of either superficial or deep-seated inflammatory and congestive conditions. It is an excellent and popular substance for the continuous application of moist heat and is employed in pneumonia, pleurisy, carbuncles, tonsillitis, alveolar abscess and in all cases where inflammation or congestion is a factor and local treatment is indicated. The dressing should always be covered with a liberal supply of absorbent cotton and a suitable bandage. It can remain on from 12 to 24 hours. It is a proprietary article, and full directions for its use are given with each package. It is sold hermetically sealed in an airtight, seamless container, designed especially for it.

## ASPIRIN

(NOT OFFICIAL)

**Formula.**  $\text{C}_6\text{H}_4 \begin{cases} \text{O}-\text{COCH}_3. \\ \text{COOH}. \end{cases}$

**Synonym.** Acetyl salicylic acid.

**Source.** It is an acetic ester (or compound ether) of salicylic acid.

**Characters.** It is a white crystalline powder, practically insoluble in water, soluble in alcohol.

**Pharmacology.** It is an analgesic with certain hypnotic properties, and has been introduced as a substitute for the salicylates.

**General and Dental Therapeutics.** It is given for the relief of pain in cases of rheumatism, migraine, trigeminal and supraorbital neuralgia. It should not be prescribed with alkalis, such as sodium bicarbonate, nor should mineral waters be taken during its administration, as these would lead to an earlier disintegration of the compound. In cases of defective acidity of the stomach it might be recommended to administer aspirin.

For sleeplessness associated with pain the following can be prescribed :

Aspirin	.	.	.	.	.	8 grains.
Veronal	.	.	.	.	.	5 „

To be made into a powder and taken an hour before bedtime.

For neuralgia associated with odontalgia :

Aspirin	.	.	.	.	.	10 grains.
Citrate of caffeine	.	.	.	.	.	2 „

in small quantities of water containing hydrochloric acid.

**Dose.** 10 to 15 grains, best given in the form of cachets. For children  $\frac{1}{2}$  to 5 grains three times a day according to age.

## BUTYL-CHLORAL HYDRAS

### BUTYL-CHLORAL HYDRATE

**Formula.**  $\text{CH}_3\text{CHClCCl}_2\text{CH}(\text{OH})_2$ .

**Synonym.** Croton chloral hydrate.

**Source.** Made by the action of chlorine gas upon aldehyde.

**Characters.** Small white silvery crystals, with a sweetish taste like that of melons. Soluble in spirit and glycerin, 1 in 50 of water.

**Pharmacology.** It is an anodyne, anæsthetic and hypnotic. It has the peculiar effect of narcotising the brain without the rest of the nervous system being affected, but its special action is on the fifth nerve. As a hypnotic it is inferior to chloral hydrate.

**General and Dental Therapeutics.** Given to relieve the pain of tic-douloureux and all kinds of neuralgia. Where ammonium chloride has failed to give relief the author generally prescribes the following :

Butyl-chloral hydrate	.	.	5 grains,
Syrup of tolu	.	.	1 drachm,
Spirit of chloroform	.	.	10 minims,
Water to	.	.	$1\frac{1}{2}$ ounces,

and orders the dose to be repeated in an hour if relief is not obtained. It can also be given in the form of a pill (3 grains every quarter-hour for the first hour, and afterwards every hour). It is of little use in odontalgia

pure and simple, unless this induces neuralgia, in which case it will relieve the neuralgia whilst the odontalgia remains.

**Dose.** 5 to 20 grains.

## CHLORAL HYDRAS

### CHLORAL HYDRATE

**Formula.**  $\text{CCl}_3\text{CH}(\text{OH})_2$ .

**Source.** Anhydrous ethylic ether is saturated with dry chlorine and chloral is formed. It is purified by sulphuric acid and then by lime; water is added to form a hydrate.

**Chararcters.** Colourless crystals with a pungent odour and a bitter taste. Freely soluble in water, alcohol or ether.

**Pharmacology.** It is a powerful hypnotic; it has certain anodyne effects combined with other drugs, and in dilute solutions (5 grains to 1 ounce of water) is a weak antiseptic. From its depressant action on the heart it should be given with great caution, particularly in cases of pulmonary disease, fatty degeneration of the heart and atheromatous blood-vessels. Care should also be taken when prescribing this drug that the patient does not acquire the "chloral habit."

**General and Oral Therapeutics.** It is given to produce sleep in all cases of insomnia excepting that caused by pain. If in such cases sleep is obtained by giving a powerful dose (which is unwise), the patient wakes to suffering as before; but both sleep and relief from pain may be procured by the judicious combination of morphine and chloral.

*As an anodyne.* The chief local use of this drug to dentists is, when combined with camphor and aconite, to *alleviate* the pain of tooth extraction. In such cases the following prescription can be used :

Chloral hydrate	} of each 2 drachms.
Camphor	
Tincture of aconite	} of each $\frac{1}{2}$ an ounce.
Chloroform	

Apply carefully with a camel's-hair brush over the root or roots of the tooth to be extracted, and allow it to remain one or two minutes before operating.

**Dose.** 5 to 20 grains.

**Symptoms of Poisoning.** Deep coma, weak, irregular and feeble pulse, coldness, lividity and absence of reflex movements.

**Antidotes.** Emetics, stomach-tube, hot coffee, amyl nitrite, artificial respiration, warmth, friction, massage.

## CHLOROFORMUM

### CHLOROFORM

**Formula.**  $\text{CHCl}_3$ .

**Source.** It is made by heating ethylic alcohol with chlorinated lime and slaked lime, washing with water and sulphuric acid and adding 1 per cent. by weight of absolute alcohol to preserve it.

**Characters.** It is a colourless, heavy, volatile liquid with an agreeable odour and a sweetish taste. It is soluble in spirit, ether, olive oil and turpentine; only slightly so in water. Sp. gr. 1.490 to 1.495.

**Preparations.** Aqua chloroformi, linimentum chloroformi, spiritus chloroformi, tinctura chloroformi et

morphinæ compositus (this latter is an imitation of the proprietary medicine, chlorodyne).

**Pharmacology.** It is an anæsthetic, both general and local, carminative, antispasmodic, anodyne, stimulant, obtundent, sialogogue and solvent. In the mouth it stimulates the mucous membrane and increases the flow of saliva. This is very noticeable when applying it to a cavity in a carious tooth.

**General and Dental Therapeutics.** *As a general anæsthetic.* The author is of opinion it should never be given for dental operations. Whilst we have such comparatively safe anæsthetics as nitrous oxide gas (continuous administration for numerous extractions or combined with ether) he considers it nothing more or less than criminal to administer it for this purpose, so the matter is not discussed in these pages. On the other hand, it is quite justifiable to administer it in reducing a dislocation or setting a fracture of the mandible as a means of reducing muscular spasm.

*As a local anæsthetic.* It is used for the extraction of easy teeth and loose roots by placing saturated pledgets of cotton-wool on each side of the gum and allowing them to remain a few minutes before operating. In ordinary or difficult cases this method should never be advised, for if it is successful it is more likely to be due to the "faith" of the patient than to the drug. Combined with belladonna and aconite it is used as a local application for the relief of neuralgia. (See Belladonna.)

*As an obtundent.* It occasionally relieves the pain of sensitive dentine, but is inferior for this purpose to novoeain, carbolic acid, etc.



*As an antispasmodic.* It is administered by inhalation for the convulsions of teething and spasm of the glottis.

*As a solvent.* Applied to carious cavities (after the removal of caries) and pulp canals it is employed for removing any fatty material which may remain in either.

It is a solvent of gutta-percha, and is used with that material for filling root canals and lining cavities. (See Gutta-Percha.)

**Other Dental Uses.** It is used as a clearing agent in dental microscopy and as a solvent of dental rubber.

**Dose.** 1 to 5 minims.

**Antidotes.** *When inhaled.* Pull the tongue forward. Cold and warm douche to chest. Artificial respiration. Inhalation of amyl nitrite. The interrupted current. Cardiac stimulants.

*When swallowed.* Stomach-tube, emetics. Rouse the patient. Injection of hot strong coffee. Inhalation of amyl nitrite.

## CREOSOTUM

### CREOSOTE

**Source.** A product of the distillation of wood tar. It is not a simple body, but a variable compound of guaiacol ( $C_7H_8O_2$ ) and creosol ( $C_8H_{10}O_2$ ) and other phenols.

**Characters.** A colourless, transparent liquid when fresh, but becomes yellow or brown after exposure to air. It has a strong odour and burning taste and much resembles carbolic acid, but, unlike it, does not solidify on cooling. Sparingly soluble in water, freely so in

alcohol, ether and glacial acetic acid. It explodes if mixed with silver oxide.

**Pharmacology.** It is a rubefacient, escharotic, styptic, antiseptic, deodorant, coagulant, obtundent of sensitive dentine, and sialogogue. When applied to the tongue it produces great pain and causes a strong taste of smoke and a copious flow of saliva.

**General Therapeutics.** It is used in the form of an inhalation and also in capsules as a disinfectant and deodorant in all diseases of the lungs attended with foul discharges, for the vomiting of pregnancy, hysteria, sea-sickness and gastric irritability. In general practice guaiacol has been used instead of creosote, particularly in diseases of the lungs, as it is more agreeable.

**Dental Therapeutics.** *As an antiseptic.* It is used as a dressing for dead teeth, but some prefer carbolic acid. It is used in the same way. (See Carbolic Acid, page 138.)

With tannic acid it forms a useful application in ulceration and suppuration of the pulp. Combined with equal parts of iodine tincture it can be used as an injection for alveolar abscess. This is not only antiseptic but stimulating.

*As an obtundent.* For caries of the temporary teeth which are painful and which require stopping to prevent their too early removal it is most efficacious, and the same can be said of it in the toothache of pregnancy.

It will frequently relieve the pain of sensitive dentine where other drugs have failed.

*As a styptic.* After extraction of teeth, if there is hæmorrhage and no other drug available, creosote can be used on some cotton-wool and pressure applied.

**Dose.** 1 to 5 minims in pill or in capsules.

**Symptoms of Poisoning and Antidotes.** Same as Carbolic Acid.

## EUCAINÆ HYDROCHLORIDUM

(NOT OFFICIAL)

EUCAIN HYDROCHLORIDE

**Formula.**  $C_{15}H_{21}O_2N, HCL$ .

**Source.** It is the hydrochloride of benzoyl-vinyl-diaceton-alkamine (eucaine B).

**Characters.** It is a synthetic compound closely allied to cocaine and is seen in the form of small white opaque crystals. It is soluble in 30 parts of water and can be sterilised by boiling without decomposition.

**Pharmacology.** It is a local anæsthetic and obtundent. Its advantage over cocaine when injected is (1) the heart's action is rarely, if ever, affected in any way; (2) the anæsthesia is more prolonged both as regards time and locality.

**Dental and General Therapeutics.** It is used as a local anæsthetic for all minor operations, the part to be operated on being anæsthetised by an injection or injections of the drug. For the extraction of teeth 20 minims of a 4 per cent. solution can be injected on each side of the gum, allowing about five minutes to elapse before extracting (see Local Anæsthesia, page 249).

The efficiency of the drug is greatly enhanced by the addition of adrenalin, and a very convenient combination is to be found in eudrenine.

**Dose.**  $\frac{1}{10}$  to  $\frac{1}{2}$  grain.

**Eudrenine** is the trade name of a concentrated solution of eucaine and adrenalin.

## FORMALIN

(NOT OFFICIAL)

**Source.** It is a 40 per cent. solution of formic aldehyde in water.

**Pharmacology.** It is an antiseptic, germicide, disinfectant, caustic, irritant, mummifying agent and preservative. A 3 per cent. solution will kill pathogenic organisms in one minute.

**General Therapeutics.** It is not much used in general surgery, as it retards healing, but it is a most powerful disinfectant. The 3 per cent. solution can be used to sterilise hands and instruments, and as a spray in the sick-room.

**Dental Therapeutics.** *As an antiseptic.* It is far too strong to use in the mouth save in a very weak solution. As a mouth-wash (used at the National Dental Hospital) the following can be prescribed :

Formalin (40 per cent.)	.	.	20 minims.
Essence of peppermint	.	.	2 „
Water to . . . . .	.	.	1 pint.

To be used frequently. Label “Poison.”

Its great value is in its power of penetrating tissues, sterilising as it goes. It should therefore be used with great caution and in a very weak solution when applied to sterilise a cavity where, although there is no exposure, the pulp is alive. One or two drops of a 5 per cent. solution, if placed in a putrid pulp cavity and sealed up, will render it sterile and odourless in two days. It is

used combined with cocaine, alypin and novocain in Pressure Anæsthesia (see page 251).

*As a mummifying agent.* It is said to be superior to tannic acid in mummifying a pulp after devitalisation by arsenic.

There are many preparations now on the market which are compounds of formic aldehyde with those drugs whose names are suggested by their titles, such as amyloform, cuformol, glutol, lysoform, tannoform, formidine, etc.

**Other Dental Uses.** A 2 per cent. solution is used in dental microscopy as a fixing and hardening agent. It preserves the colour of the specimens in a remarkable way.

## FORMAMINT

(NOT OFFICIAL)

**Formula.**  $5\text{CHOH} + \text{C}_{12}\text{H}_{22}\text{O}_{11}$ .

**Source.** It is a loose combination of formic aldehyde, sugar of milk and citric acid. It is prepared in tablet form, each containing  $\frac{1}{6}$  grain of formic aldehyde.

**Pharmacology.** It is an antiseptic and germicide, due to the setting free of formic aldehyde in its nascent state.

**General and Oral Therapeutics.** It is one of the best remedies we have in use for all inflammations of the throat and oral cavity. In acute tonsillitis, where gargling would be painful and practically useless, these tablets are of great value, particularly in young children, as it has a pleasant taste. They will take a "sweetie" when ordinary drugs or gargles would be refused, or administered with difficulty. In cases of localised or general pyorrhœa they are most efficacious. Being

non-toxic in their action they can be prescribed with freedom, but the patient should be told to allow them to dissolve slowly in the mouth. After ordinary extractions or any operation on the mouth they can be prescribed in addition to the usual antiseptic mouth-wash. The dental surgeon occasionally comes across cases of irritable throat caused by excessive smoking or alcoholic indulgence which prevents the patient keeping the mouth open. This condition will be relieved by giving one or two tablets before commencing the treatment of a tooth, and it is certainly worth trying in those cases where retching occurs when taking an impression or fitting in a new denture.

**Dose.** One or two tablets every two or three hours.

## GLUSIDUM

### GLUSIDE

**Formula.**  $C_6H_4,CO,SO_2,NH$ .

**Synonyms.** Benzoyl - sulphonimide, glucusimide, saccharin.

**Source.** It is obtained from toluene, a coal-tar derivative.

**Characters.** A light white crystalline powder, odourless, with a very sweet taste. Slightly soluble in cold water, more so in boiling water, spirit or glycerin.

**Pharmacology.** Used as a sweetening agent and to cover the taste of nauseous drugs. It has also certain antiseptic powers.

**General and Oral Therapeutics.** Given in diabetes and in those diseases where sugar is contra-indicated.

*As an antiseptic.* Saccharin, especially in alcoholic

solution, is said to have a very remarkable action on the bacteria of the mouth. It is one of the least poisonous substances used in the treatment of that cavity and has no deleterious action on the teeth.

Dr. Miller recommends the following prescription as having a very marked effect on the number of living bacteria in the mouth :

Saccharin	.	.	.	.	5 grains.
Benzoic acid	.	.	.	.	6 „
Tincture of rhatany	.	.	.	.	$\frac{1}{2}$ drachm.
Absolute alcohol	.	.	.	.	$3\frac{1}{2}$ drachms.
Peppermint oil	.	.	.	.	1 drop.
Cinnamon oil	.	.	.	.	1 „

To be used as a mouth-wash.

Mix 3 parts of this with 27 of water and hold in the mouth a full minute.

**Dose.**  $\frac{1}{2}$  to 2 grains or more. One grain sweetens 4 ounces of fluid.

## GLYCERINUM

### GLYCERIN

**Formula.**  $C_3H_5(HO)_3$ .

**Synonym.** Glycerol.

**Source.** Obtained by the decomposition and the saponification of fats and fixed oils, and contains a small percentage of water.

**Characters.** It is a colourless, inodorous fluid with a sweet taste ; it is hygroscopic, being freely soluble in water and alcohol. Sp. gr. 1.26.



**Preparations.** There are many pharmaceutical preparations of glycerin ; those of dental importance are :

Glycerinum acidi borici,

„ „ carbolici,

„ „ tannici,,

„ aluminis,

„ boracis,

„ tragacanthæ.

**Pharmacology.** It is a solvent, emollient, laxative, demulcent and nutritive. It has also antiseptic properties. The glycerins act powerfully upon the parts to which they are applied, as glycerin is readily miscible with aqueous fluids.

**General and Oral Therapeutics.** *Externally* it is used as an emollient for chapped hands and face, fissures of the lips, etc. An application by means of a brush, of salol in glycerin (1 drachm to 1 ounce) is recommended to affected parts in infantile stomatitis, combined with the internal administration of potassium chlorate. The glycerinum aluminis is a useful astringent in chronic pharyngitis and is less disagreeable than tannin.

*Internally* it is sometimes given as a *nutritive* instead of cod-liver oil in phthisis, but its use for this purpose is uncertain. It is employed to sweeten nauseous mixtures.

*As a solvent and emollient.* Combined with potassium chlorate, borax, carbolic, tannic or gallic acids it is of great service in all inflammatory conditions of the mucous membrane of the mouth and throat. In tonsillitis it should always be prescribed with whatever drug is ordered for its emollient effects. In the aphthæ of infants the following is a good prepara-

tion to use before resorting to the application of silver nitrate :

Sodium sulphite	.	.	.	30 grains.
Glycerin	}	.	.	of each 1 ounce.
Water				

To be used on cotton-wool or with a camel's-hair brush every two hours.

It should always be remembered when using carbolic acid for the relief of sensitive dentine that the solution should *not* be made with glycerin, as it would be liable to increase the pain.

**Other Dental Uses.** Employed in dental microscopy when diluted, for mounting objects. As it dissolves calcium carbonate it should be avoided when making sections of calcified structures.

It is also recommended for "boiling up" celluloid dentures in preference to oil

**Dose.** 1 to 2 drachms.

## IODOFORMUM

### IODOFORM

**Formula.**  $\text{CHI}_3$ .

**Source.** Made by heating iodine with potassium carbonate, alcohol and water, and allowing the crystalline deposit to settle.

**Characters.** It is met with either in the form of small yellow crystalline scales (powdered iodoform) or as an amorphous powder (precipitated iodoform), with an unpleasant odour and sweetish taste. Is freely soluble in fixed and volatile oils, ether and chloroform ;

only slightly so in water and spirit. It contains 96·7 per cent. of iodine.

**Pharmacology.** It is an antiseptic, disinfectant and local anæsthetic. It is not a direct germicide, but probably acts by depriving bacteria of the nourishment necessary for their activity. According to some its antiseptic properties are due to the setting free of iodine. In general practice the powdered iodoform is used, as it does not "clot," but the precipitated form is less irritating and is more commonly employed for dusting on sores. As a rule it does not cause irritation when applied locally. Should it do so, the wound must be washed with eucalyptus oil, which is a solvent. In dental practice both forms are used.

**General Therapeutics.** It is used to cleanse foul ulcers, especially of venereal origin, sores and wounds. In ulceration of the tongue of a syphilitic nature, which is very obstinate, and with ragged, thickened epithelium, deep fissures and severe pain, iodoform is most useful, not only applied locally, but also given internally. It is used as an insufflation (iodoform 1, starch 2) for ozæna, ulcers of the mouth and throat, and tuberculous ulcers of the larynx.

**Dental Therapeutics.** *As an antiseptic.* It is used either alone or combined with eucalyptus oil, or as an ethereal solution in the treatment of dead teeth. The same precautions must be taken as when using other antiseptics, such as application of rubber dam, drying cavity and canals, etc. Pump up, by means of some cotton-wool on a Donaldson bristle, a solution of iodoform and eucalyptus, and seal the cavity with gutta-percha for a few days. The ultimate treatment of the root will depend upon its condition after removal of

the dressing. Where there is any doubt of asepsis, a cotton-wool and iodoform dressing can be left in for some months and a gutta-percha filling inserted. At the end of this time the cotton-wool should be found to have retained its smell and colour, but it must not be forgotten that micrococci have been seen growing in a fluid which was impregnated with iodoform.

It is also employed for diseases of the antrum and in pyorrhœa alveolaris, but its objectionable odour has to a certain extent limited its use.

Iodoform wax (a combination of iodoform with spermaceti and sesami oils) has been used as a root filling, but its application to back teeth was not easy, in addition to which the wax in many cases seemed to disappear from the canals.

A paste of iodoform and cinnamon oil can be applied to an exposed and irritated pulp, and covered with gutta-percha or an osteoplastic filling, where devitalisation is deemed unnecessary; but one of the mummifying pastes would be preferable.

*As an anodyne.* It is supposed to lessen the pain of arsenic, and is therefore included as an ingredient of arsenical paste.

Iodoform .	.	.	.	5 grains.
Arsenic .	.	.	.	10 „
Creosote .	.	.	.	Sufficient quantity to make a paste.

Cocaine or morphine, however, is to be much preferred in place of iodoform.

In the form of an ointment mixed with vaseline it is said to relieve the pain of neuralgia, but is

seldom used for this purpose, unless mixed with tonquin bean, on account of its odour.

**Dose.**  $\frac{1}{2}$  to 3 grains.

**Symptoms of Poisoning.** Giddiness, vomiting, deep sleep which is interrupted with periods of excitement, then delirium, intense headache and sense of suffocation. The pupils are normal.

**Antidotes.** When poisonous symptoms appear from a local application, wash out the wound with eucalyptus oil. When from internal administration, give 10 grains of potassium bicarbonate every hour (Ringer).

Several drugs are spoken of as being efficacious in removing its objectionable odour. Amongst them are balsam of Peru, oils of cinnamon, lavender, or geranium, and tonquin bean. The latter is the best. Put a bean in a bottle containing the iodoform.

## SUBSTITUTES FOR IODOFORM

### ARISTOL

(NOT OFFICIAL)

**Synonym.** Di-thymol-iodide.

**Source.** Prepared by mixing an alkaline thymol solution with an iodine and potassium iodide solution.

**Characters.** It is a reddish brown powder which is insoluble in water and glycerin, soluble in alcohol, chloroform, ether, collodion and oils, and contains 46 per cent. of iodine. It should not be heated or exposed to light.

**Dental Therapeutics.** Being an antiseptic it is used in the same manner as iodoform, but is less powerful, although having thymol in its composition certainly adds to its efficacy in this respect. It is said to act well on mucous and serous membranes, and is advocated

as a dusting powder in ulcerations of the lips and oral cavity. In such cases it acts as a desiccative agent and is not an irritant. The following can be used for this purpose, also as an insufflation in cases of ozœna :

Aristol

Powdered boric acid

Powdered starch . . . . . āā ʒiv.

Combined with oil of cassia, aristol forms a good sedative root dressing, but should only be used *where pericemental inflammation is absent*, as its antiseptic properties are not considered sufficiently powerful to subdue any putrefactive changes likely to arise.

## DI-iodoform

(NOT OFFICIAL)

**Formula.**  $C_2I_4$ .

**Synonym.** Ethylene periodide.

**Source.** Prepared by the treatment of acetylene iodide with excess of iodine.

**Characters.** A yellowish crystalline powder which is almost inodorous ; soluble in chloroform, slightly so in alcohol and ether, insoluble in water. It is susceptible to light, so must be kept in a dark place. It contains over 90 per cent. of iodine.

**Dental Therapeutics.** Its action and uses are similar to those of aristol and iodol.

## EUROPHEN

(NOT OFFICIAL)

**Characters.** A yellow amorphous powder containing 28 per cent. of iodine.

**Pharmacology.** It only acts when brought into contact with secreting surfaces, which decompose it and liberate iodine.

## IODOFORMIN

(NOT OFFICIAL)

This is a whitish crystalline powder known as "odourless iodoform." It acts in the same way as iodoform.

## IODOL

(NOT OFFICIAL)

**Formula.**  $C_4HNI_4$ .

**Synonym.** Tetra-iodo-pyrrol.

**Source.** Made by acting on pyrrol with iodine in the presence of alcohol.

**Characters.** It is a light brown crystalline powder, which is insoluble in water, soluble in ether, chloroform and three parts of alcohol, and more soluble in absolute alcohol. It explodes if rubbed with mercuric chloride. It is tasteless and has no unpleasant odour like that of iodoform, and contains nearly 90 per cent. of iodine.

**Pharmacology.** It is an antiseptic, as it readily sets free iodine, and its effects are similar to those of iodoform.

**Dental Therapeutics.** *As an antiseptic.* It is used in the form of iodolised wax, which should be applied to the roots of dead teeth, on wool or bibulous paper, wrapped round a Donaldson bristle, to which it does not stick. It melts at a lower temperature than iodoform wax.

*As an obtundent.* Iodol varnish (Whitehead's varnish)



is most useful applied to sensitive dentine in cases where this tissue is soft in the neighbourhood of the pulp and there is no occasion to remove it. An osteo filling on the top of the varnish, left in for six or twelve months, will materially assist in the formation of secondary dentine.

**Dose.** 1 to 3 grains may be given in pill or capsule.

There are many other compounds of, and substitutes for, iodoform, far too numerous to describe in a work of this kind. Some practitioners fancy one, some another, and each has his own way of using it.

## NAPHTHOL

**Formula.**  $C_{10}H_7OH$ .

**Source.** Prepared from naphthalene-sulphonic acid.

**Characters.** White shining crystals with a phenol-like odour. Soluble in alcohol and ether, nearly insoluble in water. There are two kinds, alpha and beta. The latter is employed medicinally on account of its less irritating and injurious action. *Hydronaphthol* is a trade name of  $\beta$ -naphthol.

**Pharmacology.** It is an antiseptic, germicide and disinfectant. It is non-corrosive, non-irritant, non-poisonous, and odourless.

**Dental Therapeutics.** *As an antiseptic and germicide.*  $\beta$ -naphthol is used in the treatment of dead teeth. The strength of  $\beta$ -naphthol to be used to pulpless teeth is a solution of 1 in 1000 of water. As an antiseptic for carious cavities the dentine should be first dehydrated with the hot air syringe and alcohol and an alcoholic solution of 1 in 100 used.

As a mouth-wash, after scaling in pyorrhœa alveolaris, the following can be used :

Hydronaphthol	.	.	.	20 grains.
Alcohol	}	.	.	. of each 1 ounce.
Water		.	.	

Use one teaspoonful in a little water three times daily.

**Doses.** Of naphthol 2 to 5 grains, of  $\beta$ -naphthol 3 to 10.

## NOVOCAIN

(NOT OFFICIAL)

**Formula.**  $\text{NH}_2 \text{C}_6\text{H}_4 \text{COOCH}_2 \text{N}(\text{C}_2\text{H}_5)_2 \text{HCl}$ .

**Source.** It is the hydrochloride of para-amido-benzoyl-diethyl-amino-ethanol.

**Characters.** It is a crystalline powder which may be heated to  $120^\circ \text{C}$ . ( $248^\circ \text{F}$ .) without decomposition, and melts only at  $155^\circ \text{C}$ . It is soluble in its own weight of cold water and in thirty parts of alcohol. The *aqueous* solutions may be boiled repeatedly without decomposition, but with *adrenalin* solutions sterilisation must be carried out with the greatest care, as the adrenal substance loses its activity by prolonged exposure to high temperatures.

**Pharmacology.** This is one of the latest drugs introduced into both dental and general surgery for the purpose of local anæsthesia. It has practically superseded cocaine, and is now regarded by some as being superior to other drugs, such as stovaine, etc., and for the following reasons :

(1) Its lower degree of toxicity in proportion to its anæsthetic power ;

(2) Absence of any sign of irritation ;

(3) Compatibility with adrenalin preparations, such as suprarenin ;

(4) It does not affect the circulation or respiration, and the action of the heart is unimpaired.

(5) It is about ten times less toxic than cocaine and is free from any unpleasant after effects.

**General Therapeutics.** It is used for subcutaneous injections in general surgery, infiltration anæsthesia and anæsthesia of thick layers of tissue, also for operations on the eye, ear, nose and throat.

**Dental Therapeutics.** For the painless extraction of teeth a 2 per cent. of the novocain-suprarenin solution is recommended. This is now supplied either in hermetically sealed " ampoules " or in tablets. The latter consists of novocain, suprarenin borate and sodium chloride, and these should be dissolved in 17 minims of sterilised water. (For method of using, see Local Anæsthesia, page 249.)

Dr. Pare advocates its use for this purpose and claims the following advantages for it :

(1) It produces a perfect local anæsthesia ;

(2) The duration of the anæsthesia is longer than that of cocaine ;

(3) Even in strong solutions it does not irritate the tissues ;

(4) It is at least equal to cocaine in anæsthetic power ;

(5) It is many times less toxic than cocaine, in comparison with which it can be used in larger doses in perfect safety ;

(6) It is very constant in its action ;

(7) It does not produce shock, cardiac or respiratory failure, after-pain, or sloughing of the gum ;

- (8) It can be given immediately after food ;
- (9) It is not a secret preparation, but a substance of known and definite chemical composition ;
- (10) It is cheaper than most proprietary anæsthetic preparations.

**Dose.** For subcutaneous or submucous injection  $\frac{1}{5}$  to 1 grain.

## ORTHOFORM

(NOT OFFICIAL)

**Source.** It is a synthetic substitute for cocaine, being of a methyl ester of *meta*-amido-*para*-oxybenzoic acid.

**Characters.** A white crystalline powder with neither taste nor smell ; only slightly soluble in water.

**Pharmacology.** It is a non-toxic analgesic and antiseptic. When injected it is poisonous, but not when applied to mucous membranes or given internally.

**General Therapeutics.** It is used locally to relieve the pain of burns, ulcers, wounds, excoriations, etc. Is given internally for cancer and ulcer of the stomach.

**Dental Therapeutics.** It is used to relieve the "after pains" of tooth extraction. In these cases Grayston recommends packing the socket with cotton-wool or lint saturated with a paste of orthoform and water, or orthoform and alcohol ; or the socket may be filled with either the paste or the dry powder, and the orifice sealed with a ball of cotton-wool saturated with mastic or sandarach varnish.

**Dose.**  $1\frac{1}{2}$  to 3 grains (about).

## PARAFFINUM MOLLE

### SOFT PARAFFIN

**Synonyms.** Vaseline, petroleum jelly.

**Source.** Obtained by purifying the less volatile portions of petroleum.

**Characters.** A semi-solid, yellowish, greasy mass. Insoluble in water. Is not saponified by solutions of alkalies. Melts at  $95^{\circ}$  to  $102^{\circ}$  F.

**Pharmacology.** It is used as a basis for ointments intended to have a *local* effect. It is emollient in its action and (in dentistry) a lubricant.

**Dental Uses.** It is a soothing application to cracked lips and excoriated surfaces of the gums. Is useful for dipping stopping instruments into when filling with any of the osteoplastics to prevent their adherence; also for lubricating discs when contouring and trimming the silicate cements, and for smearing over model composition when taking an impression to facilitate its removal.

*Hard paraffin* is used for embedding specimens in dental microscopy, and also in the manufacture of modelling wax.

## PARAFORM

(NOT OFFICIAL)

**Source.** It is a polymer of formic aldehyde.

**Synonyms.** Trioxymethylene, paraformic aldehyde.

**Characters.** It is a white friable amorphous powder only slightly soluble in water.

**Pharmacology.** It is an antiseptic, obtundent of sensitive dentine and mummifying agent.

**General Therapeutics.** The use of this drug is practically confined to the disinfecting of sick-rooms and surgical appliances by heating it in an enclosed spirit lamp, when it sublimes, combines with the products of combustion and is converted into formic aldehyde.

**Dental Therapeutics.** *As an obtundent.* This drug was introduced into dental practice some few years ago as a very satisfactory agent for relieving the pain of sensitive dentine, but it is not wise to use it in deep cavities without first protecting the pulp. A small quantity should be made into a paste with zinc oxide and clove oil, and allowed to remain in the cavity a few days or a week; or gutta-percha containing a 5 per cent. solution of paraform can be used in the same way.

Another paraform paste is as follows:

Paraform . . . . .	1 part.
Zinc oxide . . . . .	10 parts.

Carbolic acid and menthol sufficient quantity to make a paste.

“Pardent” is a preparation of paraform intimately incorporated and equally diffused in a temporary gutta-percha, and is made in two strengths, containing respectively 2 per cent. and 5 per cent. of paraform. Its use is especially indicated in shallow hypersensitive cavities, but it should in no case be used where an exposure of the pulp is likely. Do not use too much heat to soften, as any considerable temperature rapidly reduces the strength of pardent as an obtundent. Leave in a week or ten days.

*As a mummifying agent.* It is a very safe drug to use for this purpose. (See page 257.)

## PHENACETINUM

## PHENACETIN

**Formula.**  $C_{10}H_{13}NO_2$ .

**Synonym.** Para-acet-phenetidin.

**Source.** From para-phenetidin by the action of glacial acetic acid.

**Characters.** Colourless glistening crystals, without taste or odour. Sparingly soluble in water; 1 in 21 of alcohol.

**Pharmacology.** It is an antipyretic and analgesic. Is less depressant in its action on the heart than phenazone.

**General and Dental Therapeutics.** Given for nearly every variety of pain, such as migraine, neuralgia, acute rheumatism, locomotor ataxy, sciatica, etc., and in many pyrexial conditions.

*As an analgesic* it is given in all forms of neuralgia in doses of 5 to 10 grains, and is said to relieve toothache when inflammatory conditions are present. The use of this drug and also of phenazone the author looks upon as being on the borderland of dental and medical practice, and if prescribed by the dental surgeon should be done so with the *greatest* care. He considers it is far better in cases of facial neuralgia, after carefully examining the teeth and finding no dental cause, to refer the patient to the physician.

**Dose.** 5 to 10 grains in cachets or capsules.



## PHENAZONUM

## PHENAZONE

**Formula.**  $C_{11}H_{12}N_2O$ .

**Synonyms.** Antipyrin, phenyl-dimethyl-iso-pyrazolone.

**Source.** Obtained from phenyl-hydrazine by interaction with aceto-acetic ether.

**Characters.** Colourless scaly crystals, which are odourless, but have a bitter taste. Freely soluble in water, alcohol and chloroform; less so in ether.

**Pharmacology.** It is an antipyretic, nervine sedative and analgesic. It is a great depressant of the heart's action and has certain hæmostatic properties.

**General and Dental Therapeutics.** Given in cases of fevers, pneumonia and acute rheumatism to reduce temperature, and in sciatica, lumbago and migraine to relieve pain; also applied locally and given internally in cases of epistaxis.

*As an anodyne.* It is given internally in doses of 10 grains and used hypodermically (5 per cent. solution) in cases of neuralgia, periodontitis, pulpitis and pain from an erupting wisdom tooth. It should always be administered with great care on account of its being a cardiac depressant. (See Phenacetin.)

**Dose.** 5 to 20 grains.

**Symptoms of Poisoning** of phenacetin and phenazone. Collapse, cyanosis, slow respiration, irregular pulse, profuse sweating, death from cardiac paralysis.

**Antidotes.** Keep the patient in a recumbent position and give stimulants, warmth and friction. Liq. strychnine.

ninæ hydroehloridi ℥ iii. subcutaneously to stimulate heart.

## TRIKRESOL-FORMALIN

(NOT OFFICIAL)

**Source.** This is a mixture of trikresol (which is a German speciality and consists of a purified mixture of the three cresols, ortho-, meta- and para-) and formalin in the proportion of 4 to 1.

**Characters.** It is a clear, colourless, oily fluid.

**Pharmacology.** It is a powerful antiseptic and anti-putrefactive.

**Dental Therapeutics.** In cases of putrescent pulp canals, with or without a sinus, this drug (or, rather, combination of drugs) acts like a charm. After the usual removal of the *débris* a dressing of it can be inserted and sealed with calxine, and left for forty-eight hours, when it should be removed and another dressing inserted. This can be left in for a week, unless the cavity and canals are very putrescent.

“Triformal” (a trade name) is much about the same as trikresol-formalin, but contains thymol, etc., in its composition. It is sold in the form of a liquid and powder, which is mixed into a thick paste and worked up to the apex of the root or roots, and, should there be a sinus, the paste may be forced through the apical foramen until it appears at the fistulous opening. The cavity might then be filled and the sinus treated *via* the gums.



# ORGANIC SUBSTANCES



# ORGANIC SUBSTANCES

## ACIDUM BENZOICUM

### BENZOIC ACID

**Natural Order.** Styracaccae.

**Formula.**  $C_6H_5COOH$ .

**Synonym.** Benzoyl hydrate.

**Source.** Prepared from benzoin (a balsamic resin) by sublimation.

**Characters.** It is seen in the form of white feathery crystals of a silky lustre, with a peculiar odour and warm acidulous taste.

**Preparation.** Trochiscus acidi benzoici.

**Pharmacology.** It is an antiseptic, germicide, sialogogue and stimulating expectorant. The efficacy of Friar's balsam (the compound tincture of benzoin) as a local application to wounds is due to its power as an antiseptic.

**Dental Therapeutics.** *As an antiseptic and germicide.* It can be used for these purposes in the treatment of suppuration and ulceration of the pulp by applying the dry powder, but its usefulness in this respect is decidedly inferior to other drugs. It is used as an ingredient of mouth-washes, as it has no deleterious effects on the teeth.

**Dose.** 5 to 15 grains; of the compound tincture  $\frac{1}{2}$  to 1 drachm.

## ACIDUM GALLICUM

## GALLIC ACID

**Natural Order.** Cupuliferæ.

**Formula.**  $C_6H_2(OH)_3COOH, H_2O$ .

**Source.** Made by boiling one part of powdered galls with four fluid parts of dilute sulphuric acid for half an hour, straining and purifying the crystalline product.

**Characters.** Small, silky, fawn-coloured crystals with a slightly acid and astringent taste; sparingly soluble in cold water, soluble in hot water, glycerin and alcohol. It should not be prescribed with any preparation containing iron, as these two drugs are incompatible.

**Pharmacology.** It is an internal astringent and styptic. Its local action is inferior to tannic acid, but as a remote astringent it is more powerful than an equal part of this latter drug, as tannic acid becomes converted in the blood into gallic acid and grape-sugar, and hence only part of it is available.

**General Therapeutics.** Given chiefly for its astringent properties in arresting all kinds of internal hæmorrhage, but is inferior to adrenalin and ergot for this purpose.

**Dental Therapeutics.** *As an astringent.* In some obstinate cases of alvcolar hæmorrhage, where the administration of ergot is contra-indicated, the following prescription will often prove efficacious :

Gallic acid	.	.	.	.	60 grains.
Dilute sulphuric acid	.	.	.	.	1 drachm.
Tincture of opium	.	.	.	.	1½ drachms.
Water to	.	.	.	.	6 ounces.

Two tablespoonfuls every two hours until the bleeding stops.



The same precautions should be taken as described under Iron (see page 100).

As a mouth-wash it may be used in inflammation of the oral cavity, but tannic acid is preferable.

**Dose.** 5 to 15 grains.

## ACIDUM SALICYLICUM

### SALICYLIC ACID

**Natural Orders.** Ericaceæ and Betulaceæ.

**Formula.**  $C_6H_4OH\ COOH$ .

**Source.** It is obtained either from the natural salicylates, such as the oil of winter-green, or by the interaction of sodium carbolate and carbonic acid gas.

**Characters.** It is generally seen in the form of small white crystals, which are odourless and have a sweetish taste at first which afterwards becomes acid. It is only slightly soluble in water, readily so in alcohol, ether and hot water. It is often impure, and either the "natural" or the purified acid should be employed.

**Pharmacology.** It is an antiseptic, disinfectant, errhine, sialogogue, antipyretic and anodyne. It has a strong affinity for lime, therefore its long administration may seriously affect the bones and teeth. Tannic acid interferes with its action, therefore these two drugs should not be used together.

It is often mixed with drugs, such as cocaine, as it arrests putrefaction and prevents the development of bacteria in them. A 1 per cent. solution arrests the action of ptyalin on starch.

**General Therapeutics.** It is given in doses of from 15 to 20 grains to reduce the temperature of fevers, in

acute rheumatism and sore throat of rheumatic origin. Great care should always be taken when using this drug, as it is a depressant of the heart's action.

**Dental Therapeutics.** *As an antiseptic.* It is employed for this purpose in the treatment of suppurating and gangrenous pulps by introducing the dry powder into the pulp cavity and allowing it to remain a few days, or it may be used as an ethereal solution. For inflamed conditions of the mouth and gums it is useful in the form of a solution, with equal parts of powdered cassia or cinnamon, applied with a brush.

**Dose.** 5 to 20 grains.

## ACIDUM TANNICUM

### TANNIC ACID

**Natural Order.** Cupuliferae.

**Formula.**  $C_{14}H_{10}O_9 \cdot 2H_2O$ .

**Synonyms.** Tannin, digallic acid.

**Source.** Tannic acid may be extracted by water saturated with ether from galls which have been subjected to a special fermentation.

**Characters.** Vesicular glistening masses, or scales, which are of a yellowish white colour and strongly astringent taste. Soluble in water, rectified spirit and glycerin; sparingly so in ether.

**Preparations.** Glycerinum acidi tannici, trochiscus acidi tannici and suppositoria acidi tannici.

**Pharmacology.** It is the most powerful local vegetable astringent we have on account of its action on albumen and gelatin, which in a *secondary* manner causes constriction of the blood-vessels and so acts as a styptic. As a matter of fact, tannic acid dilates blood-vessels,

but its constringent action on the surrounding tissues completely overcomes any dilatation. It has also some disinfectant and obtunding properties and is a mummifying agent.

**General Therapeutics.** It is used chiefly as a local application to stop hæmorrhages and profuse secretions from different parts of the body.

**Dental Therapeutics.** *As an astringent and styptic.* For inflamed and ulcerated conditions of the mucous membrane of the oral cavity tannic acid in various degrees of strength is most useful. As an example :

Tannic acid	.	.	.	1 to 2 drachms.
Rectified spirit.	.	.	.	1 drachm.
Rose-water to	.	.	.	10 ounces.

To be used as a mouth-wash frequently.

The same prescription, with or without the addition of such drugs as iodine tincture, tincture of myrrh, alum, glycerin or boracic acid, according to the state of any individual case, can be used for mercurial salivation, spongy gums, hypertrophy of the gums and Rigg's disease.

Should an astringent dentifrice be required, the following will answer most purposes :

Precipitated chalk	.	.	.	2 ounces.
Tannic acid	.	.	.	30 grains.
Clove oil	.	.	.	6 drops.

For inflamed and ulcerated conditions of the pulp a mixture of tannic acid (1 drachm) and sufficient creosote to make a paste, either with or without morphine acetate or cocaine, will be found most serviceable when applied with care, and pressure on the pulp prevented. This will reduce inflammation and subsequent

pain before using pressure anæsthesia or applying arsenic to devitalise.

The glycerin of tannic acid (1 in 4) is a useful application to inflamed and relaxed conditions of the uvula and fauces by painting them twice a day with a proper throat brush, also to reduce the swelling of the gum caused by a regulation plate after the plate has been eased.

*As a styptic.* Many dentists use this drug in preference to any other for stopping alveolar hæmorrhage after tooth extraction. In such cases the procedure, both before and after the application of tannic acid, is the same as with all styptics (see Iron). Whenever the author uses this drug for alveolar hæmorrhage he prefers it in the form of *styptic colloid* (a saturated solution of tannic acid and gun-cotton in ether), which, after removal of the clots, is applied with a camel's-hair brush in simple cases; but in more severe cases the sockets must be plugged and pressure applied.

*As an obtundent.* Combined with creosote it has been used for the relief of sensitive dentine, but for this purpose it must be left in several days and the cavity hermetically sealed.

*As a mummifying agent.* After the application of arsenic to a pulp and when the pulp chamber has been opened up, a dressing of tannic acid may be left in for a few days, which will harden the pulp and facilitate its removal.

**Dose.** 2 to 5 grains. Seldom given internally.

## ACONITUM

## ACONITE

**Natural Order.** Ranunculaceæ.

**Synonym.** Monkshood.

**Preparations.** Linimentum and tinctura aconiti. (Flemming's tincture of aconite is ten times as strong as that of the B.P.)

**Pharmacology.** It is a local anodyne, sedative, obtundent, (local) anæsthetic and antipyretic.

When taken internally the tincture first produces a tingling sensation on the lips and tongue, and this is followed by numbness, which may or may not extend to the extremities. It produces a sense of warmth in the stomach, reduces the frequency, force and tension of the pulse; a steady fall of temperature occurs and respiration becomes slow and irregular. Being a great cardiac depressant the pulse should be carefully watched when presenting it.

Applied *locally*, both the tincture and the liniment act as sedatives to the peripheral ends of sensory nerves and have a distinct effect in controlling inflammatory action.

**General Therapeutics.** It is given internally for all painful diseases, such as gout, sciatica, rheumatism and neuralgia; also in fevers and pneumonia, to reduce the temperature. Externally it is applied as an anodyne.

**Dental Therapeutics.** *As an anodyne, local sedative and obtundent.* Combined with equal parts of either the iodine tincture or liniment it is used for the relief of dental periostitis by painting the mixture over the

affected part with a camel's-hair brush (see Iodine). This preparation can also be painted on the gum which has been rendered tender when separating teeth. The tincture will often relieve the pain of sensitive dentine if a drop or two is placed in the cavity.

The liniment is a useful application for neuralgia, particularly when combined with belladonna and chloroform in the following proportions :

Liniment of aconite . . .	7 drachms.
„ „ belladonna . . .	7 „
Chloroform . . .	2 „

Apply on lint to the affected part and cover with a piece of sponge or flannel saturated in hot water. Care must be taken when using it on the face not to allow any to get into the eye. It should be labelled "Poison."

The following is recommended by Dr. Murrell as a good formula for a neuralgia liniment :

Aconitine (B.P.) . . .	1 grain.
Essential oil of mustard . . .	1 drachm.
Glycerin . . .	1 ounce.
Rectified spirit to . . .	6 ounces.

For external application only. Label "Poison."

*As a local anæsthetic.* Combined with other drugs, such as chloroform, chloral, pyrethrum and morphine, it has been applied to the gums previous to the extraction of teeth.

**Dose.** Of the B.P. tincture, 5 to 15 minims. Fifteen minim doses, however, are rarely required and should be prescribed with caution. One minim doses frequently repeated will often act better.



**Symptoms of Poisoning.** Sense of fatigue, muscular weakness, dimness of vision, dilated pupils, short and laboured respiration, pulse slow and small, afterwards imperceptible, paralysis, and death.

**Antidotes.** Stomach-tube, heat, brandy, ammonia, emetics, subcutaneous injection of atropine ( $\frac{1}{50}$  grain), digitalis, amyl nitrite, artificial respiration.

The **alkaloid aconitine** is not used for purely dental purposes; it is a powerful sedative poison.

## APOMORPHINÆ HYDROCHLORIDUM

### APOMORPHINE HYDROCHLORIDE

**Formula.**  $C_{17}H_{17}NO_2 \cdot HCl$ .

**Source.** It is obtained by heating morphine or codeine in sealed tubes with hydrochloric acid.

**Characters.** Small greyish white, shining needles turning green on exposure to light and air. Soluble in water and spirit.

**Preparation.** *Injectio apomorphinæ hypodermica.*

**Pharmacology.** When used hypodermically in doses of  $\frac{1}{10}$  gr., *i.e.* 5 minims of the injection, it causes rapid emesis. If given by the mouth it acts as an expectorant. It is not in any way allied to morphine.

**Therapeutics.** Its great value is as an emetic in cases of poisoning, as it is quick and certain in its action and causes no unpleasant after-effects. When given internally as an expectorant it does not cause vomiting.

The following points, taken from Dr. Murrell's work on pharmacology and therapeutics, are worth noting:

- (1) That although made from morphine it has no narcotic properties.
- (2) Given hypodermically it is a powerful emetic.



(3) Given by the mouth it is the best of all expectorants.

(4) The Pharmacopœia solution is absurdly named, as the "Injeetio Apomorphinæ Hypodermica" is more frequently administered by the mouth than subcutaneously.

(5) It is not necessary that the solution should be freshly prepared.

(6) A few drops of dilute hydrochloric acid will prevent the solution from turning green.

(7) It can be prepared from either morphine or codeine.

(8) There are two doses for apomorphine, the expectorant dose and the emetic dose, just as there are two doses of ammonium carbonate.

**Doses.**  $\frac{1}{20}$  to  $\frac{1}{10}$  gr. hypodermically, as an emetic.  
 $\frac{1}{10}$  to  $\frac{1}{4}$  gr. by the mouth, as an expectorant.  
 The hypodermic injection, 5 to 10 minims.

## BELLADONNA

**Natural Order.** Solanaceæ.

**Synonym.** Deadly nightshade.

**Description.** The leaves and roots of the *atropa belladonna*, or deadly nightshade.

**Preparations.** There are numerous preparations of belladonna. Those of dental interest are the linimentum belladonnæ and extractum belladonnæ liquidum.

**Pharmacology.** It is a local anæsthetic, analgesic, anti-sialic, antispasmodic, anhidrotic and depressant of the heart's action. After moderate doses it will cause dryness of the mouth and throat with difficulty of swallowing and dilatation of the pupils; with a full

dose the pulse is reduced in frequency (at first), delirium occurs and a rash resembling scarlet fever may appear.

**General and Dental Therapeutics.** It is used as a local application in all forms of neuralgia, acute gout, boils, erysipelas and superficial inflammations.

Given internally to relieve the symptoms of chorea, epilepsy and megrim, to check the night sweats of phthisis and relieve cough.

*As an analgesic and antispasmodic.* Its use to the dentist is as an application to any abscess about the face, more particularly in the parotid region ; also in those cases of alveolar abscess which have been allowed to nearly burst. In such cases the local application of the following may be prescribed :

Extract of belladonna	.	.	2 drachms.
Glycerin . . . . .	.	.	4 „

To be made into a paint. Apply to the inflamed part and cover with spongio-piline or a piece of flannel which has been soaked in hot water. This will quickly cause the abscess to “ point.” Along with this treatment attention must be paid to the state of the bowels and aperients given. The abscess should then be lanced and not allowed to break, which will prevent an unsightly scar, a point of great importance, more particularly in a female patient.

In cases of enlarged and inflamed glands of the neck, whether of dental origin or not, the application of the glycerin and belladonna paint will be found most efficacious and should be combined with the internal administration of calcium sulphide. In some instances this mode of treatment will avoid the bursting of the abscess and cause the contents to be absorbed.

Belladonna is useful, too, as a liniment in cases of neuralgia, combined with chloroform and aconite in the following proportions :

Liniment of belladonna	} of each 6 drachms.
Tincture of aconite (Fleming's)	
Chloroform . . . . .	4 ,,

To be applied to the painful part on lint or flannel.

**Symptoms of poisoning.** Heat and dryness of mouth and throat, saliva suppressed, difficulty in swallowing, great thirst. Pupils dilated, delirium, etc.

**Antidotes.** Stomach-tube, emetics, stimulants, coffee, morphine, artificial respiration.

*Atropine* (the alkaloid) is sometimes used in devitalising pastes instead of morphine.

## CAFFEINA

### CAFFEINE

**Natural Orders.** Ternströmiaceæ or Rubiaceæ.

**Formula.**  $C_8H_{10}N_4O_2 \cdot H_2O$ .

**Synonyms.** Theine, Guaranine.

**Source.** It is an alkaloid obtained from the dried leaves of *Camellia thea* (common tea) or the dried seeds of *Coffea arabica* (common coffee).

**Characters.** Colourless, *inodorous*, silky crystals.

**Pharmacology.** It is a cardiac tonic, diuretic and cerebral stimulant. It is well known that tea or coffee taken at night will help to keep one awake. Excessive tea-drinking may cause dyspepsia due in all probability to the tannin in the tea. Tea-tasters, unless very careful with their teeth, not only get them very dis-

coloured, but in addition the teeth seem more liable to decay. Coffee acts with some as a laxative.

**General and Dental Therapeutics.** Occasionally it will cure migraine. By its stimulating effect on the respiratory centre it is used as an antidote in opium and alcoholic poisoning. In headache or neuralgia due to dental trouble it can be given in the form of a powder in the following proportions :

Caffeine . . . . .	1 grain.
Hydrochloride of quinine . . . . .	5 grains.
Antipyrine . . . . .	10 „

In a combined prescription like this, if relief is obtained one cannot claim that the caffeine has been the main factor. In any case the carious tooth or teeth must be treated according to conditions. It can also be combined with aspirin for the same purpose (see page 154).

**Dose.** 1 to 5 grains.

## CAMPHORA

### CAMPHOR

**Natural Order.** Lauraceæ.

**Formula.**  $C_{10}H_{16}O$ .

**Source.** A stearoptene, obtained from the wood of *Cinnamomum camphora*.

**Characters.** White, translucent, crystalline masses which have a pungent odour and are very tough. It is soluble in spirit, ether and chloroform ; only slightly so in water. Sp. gr. 0.99.

**Preparations.** Aqua camphoræ, linimentum cam-

phoræ, linimentum camphoræ ammoniatum, spiritus camphoræ.

**Pharmacology.** It is an anodyne, nerve sedative, obtundent, weak antiseptic and sialogogue.

**General and Dental Therapeutics.** Given in various nervous disorders, such as insanity, hysteria, whooping-cough, inflammation of the brain and delirium tremens. Used externally as a liniment.

*As an obtundent and anodyne.* The spirit of camphor is used to relieve the pain of sensitive dentine. Applied to cavities where the pulp is almost exposed it allays odontalgia.

Combined with chloroform in the proportion of camphor 1 drachm, chloroform 2 drachms, and applied with a camel's-hair brush, it will often relieve the excessive pain following the extraction of those teeth which have been previously affected with periodontitis.

It has been used as a local anæsthetic, before extraction, combined with ether in the same proportion as chloroform. This should be applied to the gum on cotton-wool on each side of the tooth to be extracted until the gum becomes blanched.

It is used with other drugs, such as cocaine, chloral hydrate or chloroform, as a liniment in neuralgia. The following preparation, introduced by Dr. Murrell, is used at Westminster Hospital for this purpose :

Chloral hydrate	}	.	of each	1 drachm.
Menthol				
Thymol				
Camphor				
		.	.	3 drachms.

Rub the ingredients together till liquefied and paint the affected part with a brush.

**Other Dental Uses.** It is one of the ingredients of celluloid base.

**Dose.** 2 to 5 grains.

*Monobrated camphor* is given by some for the convulsions of teething in 1-grain doses, but it is apt to irritate the stomach.

## CAPSICI FRUCTUS

### CAPSICUM FRUIT

**Natural Order.** Solanaceæ.

**Synonym.** Cayenne pepper, guinea pepper.

**Source.** The dried ripe fruit of the *Capsicum minimum*.

**Characters.** Oblong, conical, orange-red pods about  $\frac{1}{2}$  to  $\frac{3}{4}$  inch long, which contain seeds.

**Preparation.** Tinctura capsici.

**Pharmacology.** Internally it is a stimulant, carminative, pungent stomachic and sialogogue. Externally it is a counter-irritant and local stimulant.

**General Therapeutics.** Given for dyspepsia, especially in alcoholic subjects (as it allays the craving for drink), sore throat, relaxed uvula and chronic inflammation of the fauces.

**Dental Therapeutics.** *As a counter-irritant.* It is used in cases of acute dental periostitis, one method being in the form of plasters. The gum should be dried and a piece of the plaster cut to a convenient size pressed for a few minutes on the gum over the root of the affected tooth, and left on till the pain disappears. The only difficulty about the matter is to get them to *stick*, but quite recently a suction cup has been put on the market by Dr. Stempel which obviates this. Full

directions for use are given with each packet, and they work remarkably well.

*As a local stimulant.* In pyorrhœa alveolaris after scaling, it is most useful combined with aromatic sulphuric acid (see page 63).

In all chronic inflammatory states of the mouth and gums it can be used as a mouth-wash in the strength of  $\frac{1}{2}$  ounce of the tincture to 8 ounces of rose-water.

**Dose.** Of the tincture, 5 to 15 minims.

## CATECHU

### CATECHU

**Natural Order.** Rubiaceæ.

**Source.** An extract from the leaves and shoots of the *Uncaria Gambier*.

**Characters.** Is seen in the form of cubes, which are separate or agglutinated. No odour; taste bitter and astringent at first, then sweetish.

**Preparations.** Pulvis catechu compositus, tinctura catechu, trochiscus catechu.

**Pharmacology.** It is both a local and remote astringent. It acts like tannic acid and is used for the same purposes. Some prefer one, some the other. The difference between them is tannin is a glucoside and catechu is not.

**General and Oral Therapeutics.** *As an astringent.* It is used in cases of sore throat in the form of the lozenge, and the compound powder and the tincture are given internally for diarrhœa. As a mouth-wash in cases of spongy gums the tincture can be used in the strength of 2 to 3 drachms to 1 ounce of water, or a pre-



scription can be written similar to the one on page 216 by leaving out the *krameria* and substituting catechu.

**Doses.** Of the tincture,  $\frac{1}{2}$  to 1 fluid drachm; of the compound powder, 10 to 40 grains; of the lozenges 1 to 6.

## COCAINÆ HYDROCHLORIDUM

### COCAINE HYDROCHLORIDE

**Natural Order.** Erythroxylaceæ.

**Formula.**  $C_{17}H_{21}NO_4 \cdot HCl$ .

**Source.** The hydrochloride of an alkaloid obtained from the leaves of the *Erythroxylum coca*. This salt was called the *hydrochlorate* in the B.P. 1885.

**Characters.** Colourless acicular crystals, soluble in 2 in 1 of water, 1 in 3 of alcohol (90 per cent.), 1 in 3 of glycerin. The alkaloid (cocaine) is soluble in fats and oil. Its salts are not. It should be remembered that aqueous solutions of this drug quickly decompose, so *fresh* solutions should be made when required.

**Preparations.** Injectio cocainæ hypodermica, lamella cocainæ, trochiscus krameria et cocainæ.

**Pharmacology.** It is a local anæsthetic, obtundent of sensitive dentine, nervine stimulant, tonic and (in connection with pressure anæsthesia) a painless devitalising agent. It has little action on the unbroken skin, but when applied to a mucous surface or subcutaneously injected it produces complete local anæsthesia. It quickly acts on the nerves of special sense, as is seen if applied to the mucous membrane of the nose or mouth, when there is loss of smell or taste. Its effects upon the sensory nerve-endings are most marked. The action of this drug has been considerably altered since the intro-

duction of adrenalin. In combination with this drug its toxic effects are less marked.

**General Therapeutics.** It is given internally to prevent sea-sickness, for gastralgia, etc. In aqueous solutions of 2 to 10 per cent. it is used as a local anæsthetic for some of the operations on the eye, nose, ear and throat. In acute tonsillitis a 4 per cent. solution should be used, and if this is applied every hour the pain and difficulty in swallowing are speedily removed (Murrell).

In psoriasis of the tongue a 10 per cent. solution painted thereon before meals relieves the pain of the passing food.

For relaxed and sore throats the rhatany and cocaine lozenges afford great relief.

In supra-orbital neuralgia relief has been obtained by rubbing in a 10 or 20 per cent. solution of the alkaloid with clove oil (Murrell).

**Dental Therapeutics.** *As a local anæsthetic.* Up to a few years ago this was the only drug used in dentistry as an injection into the gum to obviate the pain of tooth extraction. Many accidents, unpleasant symptoms, and even fatalities occurred, due either to impurities in the solution, septic troubles, or to the extra diffusion of it through the absence of a controllable drug like adrenalin. Even with the advent of this last-mentioned drug, cocaine is not used so much as alypin, novocain, etc.

The method of procedure when injecting is the same as with other drugs of a like nature (see Local Anæsthesia, page 249).

Tablets of cocaine are now prepared in various strengths, and on dissolving one of these in a fluid drachm of sterilised water a 2 or 4 per cent. solution can be obtained.

*As an obtundent.* For obtunding sensitive dentine the author has found it fairly successful, and he prefers to use it dry. For this purpose the rubber dam should be applied and the cavity thoroughly dried with hot air, and part of a tabloid broken up, inserted and allowed to remain ten minutes before excavating or pressure with rubber applied. A more modern method is by driving cocaine into the dentine by means of a "high pressure syringe"; but it seems to the author that the procedure necessary is likely to be as painful as trying to prepare the cavity without any medicament whatever, and he much prefers (failing all absolute local treatment) the injection of alypin or novocain into the gum itself.

In cases of slightly exposed pulps which require free exposure before applying arsenic the above method can also be used.

Some of the devitalising agents contain cocaine, which considerably alleviates the pain caused by the arsenic or cobalt.

Cocaine itself will temporarily relieve toothache when mixed with clove oil, a mastich dressing being applied. The latter drug would, in all probability, have a considerable share in giving relief. The alkaloid is preferable to any of its salts for this purpose, as it is only slightly soluble in water and is less likely to be washed away by the saliva.

The salts of cocaine have now quite superseded ammonium bromide and other drugs for painting the soft palate and tissues adjacent, when a model has to be taken and retching and vomiting occur. Its efficacy is more particularly shown in cases of cleft palate.

A 4 per cent. solution on cotton-wool when applied

to the gum and allowed to remain five minutes is useful for deadening the pain of the insertion of the forceps. In cases of scaling and before applying the rubber dam the application of a 4 per cent. solution will minimise pain.

*As a devitalising agent.* Although not a devitalising agent in the real sense of the word it is one of the drugs used in pressure anæsthesia (see page 251).

**Doses.**  $\frac{1}{5}$  to  $\frac{1}{2}$  grain, of the injection, 2 to 5 minim, subcutaneously.

**Symptoms of Poisoning.** Pallor of the skin, headache, giddiness, faintness, weak pulse, prostration, great mental excitement, epileptiform convulsions. The symptoms, however, vary in different cases, some patients stating that the sensations they had passed through, after an injection for tooth extraction, were awful. These bad effects, however, were attributed to impurities in the drug.

**Antidotes.** Nitroglycerin, adrenalin, strychnine, morphine, caffeine, alcohol, ammonia inhalation. Lay the patient flat. Artificial respiration, if necessary.

*Neurocaine.* This is a trade name and is pure cocaine hydrochloride made into billets about  $\frac{1}{20}$  of an inch in thickness,  $\frac{1}{8}$  of an inch long, and weighing  $\frac{1}{12}$  of a grain each. It dissolves more rapidly than cocaine crystals, and its shape renders it peculiarly suitable for its application to a pulp. For extirpation of this organ, neurocaine acts like a charm, and the process is the same as with other similar drugs, with the exception that the billet is moistened with a drop of water immediately before pressure is applied.

It is also a most satisfactory drug to use for obtunding sensitive dentine, pressure being applied as when extirpating a pulp.

A billet of neurocaine dissolved in 8 or 10 drops of water can also be used as an injection for producing local anæsthesia.

*Codrenine* is a combination of cocaine hydrochloride and adrenalin, and is used for similar purposes to neurocaine, but the presence of adrenalin adds to its efficacy in local anæsthesia.

## COLLODIUM

### COLLODION

**Synonym.** Contractile collodion.

**Source.** Made by dissolving one part of pyroxylin (gun-cotton) in a mixture of 12 ounces of rectified spirit and 36 ounces of ether.

**Characters.** It is a colourless, syrupy and very inflammable liquid with a strong odour of ether. If, when in bottle, it becomes too thick it can always be diluted by adding a mixture of ether 3 parts, rectified spirit 1 part.

**Preparation.** *Collodium flexile*, collodium 48, canada balsam 2, castor oil 1.

**Pharmacology.** When painted on the skin it rapidly dries from evaporation of the ether, leaving a thin contractile film which is insoluble in water and acts as a protective. Flexile collodion acts in the same manner, and is less liable to crack.

**General and Dental Therapeutics.** It has been advocated as being a useful application to prevent an alveolar abscess bursting on the face, in which case it should be painted with a camel's-hair brush over the commencing abscess in several layers, when it acts as a compress and will perhaps cause the abscess to open

in the mouth. When this treatment is adopted, which is not advised, the case must be carefully watched, as pointing may occur on the face, when lancing would be necessary in order to prevent an ugly scar. This form of treatment should be combined with the internal administration of calcium sulphide. Both preparations are protective to small wounds and are used after slight operations.

**Other Dental Uses.** It is one of the drugs used in dental microscopy to assist in obtaining sections of hard and soft tissues together.

In the workroom it is used, when not too thick, to coat plaster models.

## ERGOTA

### ERGOT

**Natural Order.** Graminaceæ.

**Synonym.** Ergot of rye.

**Source.** The sclerotium of the *Claviceps purpurea* (a fungus growth) attacking the ovary of *Secale cereale*, the common rye.

**Characters.** It occurs in grains about an inch in length which are longitudinally furrowed and have a disagreeable odour and taste.

**Preparations.** Extractum ergotæ, injectio ergotæ hypodermica, extractum ergotæ liquidum, infusum ergotæ, tinctura ergotæ ammoniata. Ergotin is another name for the extract, and is not an alkaloid.

**Pharmacology.** From a dental point of view its chief use is as a hæmostatic, as under its influence the arteries and arterioles become distinctly smaller, the latter becoming closed and the heart's action being



reduced in frequency. Its action on the spinal cord and uterus would be out of place in a work of this kind, but slight reference to the latter is noted under dental therapeutics. It has no external action.

**General Therapeutics.** It is employed in all forms of hæmorrhages, whether from the lungs, stomach, intestines or uterus; also in parturition. In severe cases of hæmorrhage 2-drachm doses of the liquid extract can be given every hour or oftener (Murrell).

**Dental Therapeutics.** *As a hæmostatic.* In some cases of alveolar hæmorrhage after local applications such as adrenalin, iron, tannic acid, matico, etc., have failed, ergot is of the greatest service, especially if it is noticed that the blood after leaving the socket rapidly coagulates. This shows a want of contractile power in the coats of the artery or arteries, and in such cases ergot is invaluable and should be given as follows :

Liquid extract of ergot	.	.	1½ drachms.
Dilute sulphuric acid	.	.	40 drops.
Water to	.	.	4 ounces.

Order two tablespoonfuls to be taken every half-hour till the bleeding ceases.

Or it may be administered hypodermically, in which case a freshly made hypodermic injection of ergotin should be used and 3 to 10 minims injected deep into the muscles, and not just beneath the skin as in ordinary hypodermic injections, as it is likely to produce irritation. These two methods may be combined; if so, the mixture should be ordered less frequently, viz., about every three hours. The ergotin "tabloids" are also a convenient method of administering the drug. Each "tabloid" contains three grains of ergotin, which



should be completely dissolved in a little hot water or swallowed entire.

This drug should not be given to restrain alveolar hæmorrhage if the patient be pregnant.

<b>Doses.</b>	Liquid extract . . .	10 — 30 mins.
	Ergotin . . .	2 — 8 gr.
	Hypodermic injection . .	3 — 10 mins.
	Infusion . . .	1 — 2 oz.
	The tincture . . .	$\frac{1}{2}$ — 1 dr.

**Symptoms of Poisoning** (Murrell). Toxic action very slight unless the patient is pregnant, when there would be the usual signs of abortion.

**Antidotes.** Stomach-tube or emetics, tannic acid, stimulants; the recumbent position and warmth to the extremities.

## EUGENOL

(NOT OFFICIAL)

**Natural Order.** Myrtaceæ.

**Formula.**  $C_{10}H_{12}O_2$ .

**Synonym.** Eugenic acid.

**Source.** It is obtained by oxidising clove, cinnamon, and other oils.

**Characters.** A colourless oily liquid which darkens on exposure and has a strong clove odour.

**Pharmacology.** It is an antiseptic, analgesic and obtundent of sensitive dentine.

**Dental Therapeutics.** It generally relieves the pain of an exposed or partially exposed pulp, and is recommended as a root dressing after the removal of a recently devitalised pulp. Its antiseptic properties are not very great.

## EUTHYMOL

(NOT OFFICIAL)

**Description.** This is a proprietary article and is a liquid of a pale green colour with an agreeable odour, and is composed of a mixture of eucalyptus, gaultheria, wild indigo, boric acid, menthol and thymol.

**Pharmacology.** It is an antiseptic, germicide and deodorant.

**Oral Therapeutics.** This preparation is a soothing antiseptic mouth-wash for all forms of inflammation of the oral cavity. It is also useful after ordinary extractions, and in both cases it can be prescribed in the proportion of one to two teaspoonfuls in half a tumbler of warm water three or four times a day. The addition of glycerin is an advantage.

## GELSEMII RADIX

YELLOW JASMINE

**Natural Order.** Loganiaceæ.

**Source.** The dried rhizome and rootlets of *Gelsemium nitidum*.

**Characters.** Nearly cylindrical in shape and having the rootlets attached or not. Odour aromatic, taste bitter.

**Active Principles.** Gelsemine and gelseminine; the latter is highly toxic.

**Preparation.** Tinctura gelsemii.

**Pharmacology.** It is a great depressant of both the heart and nervous centres, especially of the motor parts of the cord. It is an anodyne, antispasmodic and febrifuge.

**General and Dental Therapeutics.** It is given in cases

of migraine, neuralgia, tetanus, asthma and whooping-cough. According to some authorities it is a great remedy for neuralgia of the fifth nerve associated with carious teeth, but ammonium chloride and butyl-chloral hydras are generally more effective. In combination with butyl-chloral hydrate a convenient and reliable means of administering this drug is Parke, Davis and Co.'s sugar-coated pill of butyl-chloral hydrate with gelsemine; each pill contains 3 grains of the former drug with  $\frac{1}{200}$  grain of the latter. One pill may be given for a dose. It can be ordered in doses of 10 minims of the tincture every two hours, but a safer method is to give three or four drops every half-hour. Some advocate 20 minims every one and a half hours, and repeat the dose up to three doses, and if this fails to relieve the pain, to stop, as a further quantity would do no good and might lead to ill-effects. Others recommend 15 minims for a dose with the addition of 5 grains of quinine sulphate. During its administration it is necessary that the symptoms be watched, owing to its poisonous nature. The alkaloid has been used in doses of  $\frac{1}{30}$  of a grain three times a day without any evil effects.

**Doses.** Of the tincture . . . . . 5 — 15 mins.  
 „ alkaloid (gelsemine) .  $\frac{1}{60}$  —  $\frac{1}{20}$  gr.

Be very careful in prescribing gelsemine, as it has been mistaken for *gelseminine*, which is a powerful poison.

**Symptoms of Poisoning.** Headache, vertigo, double vision, paralysis of the ocular and levator palpebræ muscles, laboured respiration which ultimately fails and unsteady gait. Death occurs from asphyxia.

**Antidotes.** Stomach-tube or emetics if seen early, stimulants, hypodermic injection of atropine  $\frac{1}{50}$  grain, artificial respiration.

## GLYCOTHYMOLINE

(NOT OFFICIAL)

**Description.** This is a proprietary article of a dark pink colour and an agreeable taste, and is composed of thymol, menthol, glycerin, alcohol, potassium carbonate, sodium benzoate borate and salicylate, and is coloured with cochineal.

**Pharmacology.** It is an alkaline antiseptic.

**Oral Therapeutics.** In all catarrhal conditions of the mucous membrane of the oral cavity, it can be employed as a mouth-wash with perfect safety, in the proportion of about two teaspoonfuls in half a tumbler of warm water.

## GOSSYPIUM

COTTON

**Natural Order.** Malvaceæ.

**Synonym.** Cotton-wool.

**Description.** The hairs of the seeds of the *Gossypium barbadense* and other species of *Gossypium*, from which fatty matter and all foreign impurities have been removed. This is commonly called "absorbent cotton-wool." Ordinary cotton-wool contains 10 per cent. of fixed oil and is called "non-absorbent."

**General and Dental Uses.** It is employed both in general and dental surgery with various drugs, such as carbolic acid, salicylic acid, boracic acid, eucalyptus, iodoform, mercuric and ferric chloride. Lawton's absorbent cotton-wool is the best. This possesses a

beautiful downy flocculence and will absorb fourteen times its own weight of blood, water or pus. Pyroxylin (gun-cotton) is made from it.

It acts as a *mechanical* styptic when applied to a wounded surface. In conjunction with various gum-resins it is used as a temporary stopping, and with antiseptics as a temporary root-filling. It is also a practically non-painful means of separating teeth.

*For dental purposes only* the following are prepared : *Absorbent dental rolls* (made in four sizes). These are a substitute for a napkin or the rubber dam, and are held in position with suitable clamps.

*Aseptic absorbent points*, for drying pulp canals.

*Aseptic dental napkins*, two sizes.

*Carbonised cotton*, for filling pulp canals.

*Cotton-wool pellets*, made in four sizes for wiping out cavities.

*Sterilised bibulous paper*, in sheets.

All these should be burnt after use.

## GUTTA-PERCHA

### GUTTA-PERCHA

**Natural Order.** Sapotacæ.

**Source.** The concrete juice (gum) of the *Palagium oblongifolium* and other trees of the same order.

**Characters.** Is seen in the form of light brown pieces, which are tough and flexible. It is insoluble in water and alcohol; almost soluble in chloroform; entirely so in cajuput and eucalyptus oils, carbon disulphide, or benzol.

**Dental Uses.** Combined with silica and other substances it forms a plastic material for filling teeth.

Various kinds are used for this purpose, viz., Hill's Gilbert's, White's and Jacobs'. The first two should only be used as temporary fillings for holding in various forms of dressings, as they do not last, whilst White's and Jacobs', particularly the latter, in *suitable* cavities, will compare favourably with many of the so-called permanent stoppings. It is certainly to be preferred in many cases to some of the posteolastics, but the same care is required for preparing the cavity and plugging as with gold, such as :

- (1) Keep the cavity dry.
- (2) Make anchorages to retain the filling.
- (3) Use only small pieces at a time.
- (4) Discard pieces which have been *burnt* in the flame of the spirit-lamp.

(5) Do not introduce the first two or three pieces too hot, or they will cause pain.

(6) Mop out the cavity first of all with chloroform or a solution of gutta-percha in chloroform to secure adhesion.

(7) Finish off the filling with cold instruments slightly greased and then use a little chloroform. The latter is said to be liable to make the filling porous, but this is not so if a hot instrument be used finally.

It is a perfect non-conductor and non-irritant, but however carefully applied it does not make an *absolutely* water-tight filling.

In teeth where the decay extends below the gum it is most useful for filling up the cavity to just beyond the level of the gum margin, the operation being completed with an osteo. In certain cases of decay where the saliva is very acid and where gold cannot be adapted it is much more preferable to the osteoplastics, which

would quickly wash out. In crown cavities, or those exposed to friction, gutta-percha fillings are of no use, as they wear away.

A solution of gutta-percha in chloroform makes an excellent cap to a slightly exposed pulp, which is non-irritating and protective; and the same solution forms an efficient material for filling the roots of dead teeth after they have been rendered aseptic.

It is useful for separating back teeth by inserting a piece into the cavity and leaving a slight excess for the patient to bite on. In separating front teeth strips of tape or rubber are generally used at first. These cause in a few hours great tenderness, especially the latter substance, and the patient is unable to bear any excavating. By replacing the tape or rubber with a piece of gutta-percha and waiting a few days all tenderness disappears and the tooth can be prepared and stopped.

**Other Dental Uses.** It is also used for taking impressions of the mouth and making dental splints in cases of fracture of the mandible.

## HAMAMELIS

**Natural Order.** Hamamelidaceæ.

**Synonym.** Witch hazel.

**Source.** The dried bark and leaves of the *Hamamelis virginiana*.

**Characters.** Seen in the form of quills or slightly curved pieces 2 to 8 inches long and  $\frac{1}{10}$  inch thick and the latter 4 to 6 inches long, oval or obtuse in shape and toothed in the margin. Both have an astringent and bitter taste and contain tannic acid, bitter and odorous matters.



**Preparations.** Tinctura hamamelidis (from the bark), extractum hamamelidis liquidum, liquor hamamelidis (hazeline), unguentum hamamelidis (from the leaves).

**Pharmacology.** It is an astringent and hæmostatic, both locally and remotely. It has no poisonous action.

**General Therapeutics.** It is used to check hæmorrhages from the nose, lungs, bowels or uterus, also for diarrhœa and hæmorrhoids. For the latter it is given internally and applied externally as an ointment.

**Dental Therapeutics.** *As an astringent and hæmostatic.* It is used by some as a mouth-wash in cases of tender spongy gums, aphthæ and stomatitis, in the proportion of 1 ounce of the tincture to 10 ounces of water.

For hæmorrhage after extraction it can be applied locally and given internally in doses of  $\frac{1}{2}$  drachm of the tincture every three hours.

<b>Doses.</b>	Of the tincture . . . . .	$\frac{1}{2}$ — 1 dr.
	„ liquid extract . . . . .	5 — 15 mins.
	Hazeline . . . . .	$\frac{1}{2}$ — 3 dr.

The B.P. gives no dose for the liquor.

## KRAMERIÆ RADIX

### KRAMERIA ROOT

**Natural Order.** Polygalaceæ.

**Synonym.** Rhatany root.

**Source.** The dried root of *Krameria triandra* (Peruvian) and of *Krameria argentea* (Para).

**Characters.** It is odourless and has an astringent bitter taste ; when chewed it tinges the saliva red.

**Preparations.** There are many preparations. Those used by dentists are :

Extractum krameriaë, tinctura krameriaë, trochiscus krameriaë et cocainæ.

**Pharmacology.** It is a powerful astringent, this property being due to the presence of tannic acid, of which it contains a large percentage.

**General and Oral Therapeutics.** *As an astringent.* It is most efficacious in ulcerated and spongy gums. The prescription the author generally uses is :

Tincture of krameria	.	.	.	2 ounces.
Eau de Cologne	.	.	.	1 ounce.
Glycerin	.	.	.	2 ounces.
Rose-water to	.	.	.	12 „

To be used as a mouth-wash.

For inflamed and relaxed conditions of the fauces Allen and Hanbury's rhatany and cocaine lozenges are most useful. They contain 2 grains of the extract and  $\frac{1}{20}$  grain of cocaine hydrochloride with a fruit basis ; four to six should be taken during the day.

<b>Doses.</b> Of the extract	.	.	.	5 — 15 gr.
„ tincture	.	.	.	$\frac{1}{2}$ — 1 dr.

## LISTERINE

(NOT OFFICIAL)

**Description.** This is a proprietary article and is a clear amber-coloured liquid with a slightly acid reaction, a fragrant aromatic odour and a pungent taste. It contains thyme, eucalyptus, baptisia, gaultheria, mentha arvensis and purified benzo-boracic acid.

**Pharmacology.** It is a powerful non-toxic antiseptic, preventive of fermentation and deodorant.

**General Therapeutics.** Externally it is used as a dressing for wounds and ulcers, as a spray in ozœna after a preliminary cleansing with sodium bicarbonate. Given internally for dyspepsia and diarrhœa.

It is most useful in cases of severe illness, where the patient is unable to cleanse the mouth, to mop it round with a small sponge on a sponge-holder which has been dipped in a weak solution of listerine; or, should the patient be able to use a feeding-cup, a better result would be obtained by taking the solution into the mouth through the spout, rinsing the oral cavity, then closing the lips tightly on the spout and forcing the liquid back into the cup. These directions apply not only to this drug, but to any mouth-wash of an antiseptic or astringent nature.

**Dental Therapeutics.** *As an antiseptic.* It is most useful as a mouth-wash for all affections of the oral cavity in the strength of 2 drachms or more to 2 ounces of water. As a prophylactic agent it should be used for temporary teeth with a tooth-brush. Its use as a mouth-wash should always be advocated to those who wear bridge work.

In cases of fracture of the jaw, where the patient is unable to open the mouth, syringe out frequently during the day with a weak solution.

It has been used in full strength for the treatment of dead teeth, but its germicidal power is not very strong, being but equal to a 5 per cent. solution of carbolic acid. One of its advantages for this purpose is that it is a non-coagulant and non-toxic.

**Dose.** 1 to 2 drachms, diluted.

## MASTICHE

## MASTICH

(NOT OFFICIAL)

**Natural Order.** Anacardiaceæ.

**Source.** It is a concrete resinous exudation which flows from the stem of the *Pistacia lentiscus*.

**Characters.** It is seen in the form of small yellowish tears which are transparent and brittle, becoming ductile when chewed. It is insoluble in water, soluble in ether and chloroform. The best way to make a solution is to put 2 ounces of mastich in a *wide-mouthed* bottle and add 1 ounce of ether; leave for a few days and then decant into a fresh bottle. This will give a nice clear solution, as the gum-resin contains many impurities and these settle at the bottom of the first bottle. It must be kept in a well-stoppered bottle, but no matter what care is taken, evaporation of the solvent is sure to take place and render the mixture unfit for use; this can be remedied by the occasional addition of a little more ether or chloroform. The former is preferable, as it evaporates quicker when the solution is used as a cotton-wool dressing in a tooth.

**Dental Uses.** It is used as a temporary filling for the retention of dressings by saturating a pellet of cotton-wool with the solution and placing it in a cavity which has been previously dried and treated. Quite recently several "temporary" cements have been placed upon the market to retain dressings. They are easily and quickly applied, as easily removed, and are far preferable from an aseptic point of view. The

same can be said of temporary gutta-percha, excepting where it is exposed to a masticating surface.

Mastich is also used as one of the means for helping to separate teeth by packing in cotton-wool which has been previously dipped in the solution, or, what is better, is to first pack in the wool and then saturate it with the solution. The use of temporary gutta-percha for this purpose is, in the author's opinion, also much to be preferred. It is certainly more reliable and cleanly.

It is used in microscopy as a varnish.

## MATICÆ FOLIA

(NOT OFFICIAL)

MATICO LEAVES

**Natural Order.** Piperacæ.

**Source.** The dried leaves of *Artanthe elongata*.

**Characters.** They are from 2 to 8 inches long and 1 inch in breadth, tessellated and of a bright yellow colour on the upper surface; reticulated, downy and lighter in colour on the under.

**Pharmacology.** It is a local hæmostatic, its power as such being due to the mechanical structure of the leaf, which, when applied, should have the under or downy side placed next to the bleeding surface. Its styptic properties are more mechanical than chemical.

**Dental Therapeutics.** *As a local hæmostatic.* The leaf must be softened in hot water and cut into strips as wide as the alveolus is deep, rolled up like cigars, the rough or under surface outwards, and placed in the alveolus or alveoli with plugging forceps, all the clots having been previously removed. Pledgets of cotton-

wool or lint should be placed on the top of this and the patient told to bite firmly. The same directions should be given to the patient as when using ferric chloride (see Ferri Perchlor.).

## MENTHOL

### MENTHOL

**Natural Order.** Labiatae.

**Formula.**  $C_6H_9, OH, CH_3, C_3H_7$ .

**Synonym.** Peppermint camphor.

**Source.** A stearoptene obtained by cooling the oil distilled from the fresh herb of *Mentha arvensis* and of *Mentha piperita*.

**Characters.** Colourless acicular crystals with the odour of peppermint, or fused crystalline masses. Sparingly soluble in water or glycerin, freely so in spirit.

**Preparation.** Emplastrum menthol.

**Pharmacology.** It is a local anæsthetic, antiseptic, analgesic and carminative. When applied to the skin it produces a feeling of cold and numbness, and thereby relieves pain, especially if it be used along the course of a superficial nerve.

**General and Dental Therapeutics.** For neuralgia and migraine the cones of menthol may be rubbed gently over the seat of pain, or the menthol plaster can be applied over the painful part. Its action, however, is so evanescent that only a very temporary benefit is obtained. The pastillo (No. 56) of Allen and Hanbury, consisting of menthol, eucalyptus, and cocaine, is of great use in cases of acute sore throat whether catarrhal or ulcerative. As an insufflation menthol is used to check nasal catarrh.

*As a local anæsthetic and analgesic.* By introducing a drop or two of a solution of menthol (menthol 2 grains, clove oil 10 drops) on a piece of cotton-wool into a carious cavity it may relieve toothache. For obtunding sensitive dentine apply a few crystals and allow them to remain a few minutes. It is often incorporated in a devitalising paste for its anæsthetic properties. There is a menthol derivative called Coryfin which has been suggested as an advance on menthol for its analgesic effects. It has the distinct advantage that its effect is more prolonged than menthol, which is due to a more gradual disengagement of this drug.

*As an antiseptic.* It is used in the treatment of dead teeth, but its value for this purpose is inferior to many other drugs.

**Dose.**  $\frac{1}{2}$  to 2 grains, but seldom given internally.

## MORPHINA

### MORPHINE

**Natural Order.** Papaveracæ.

**Formula.**  $C_{17}H_{19}NO_3 + H_2O$ .

**Synonym.** Morphia.

**Source.** It is the principal and most active alkaloid of opium, the proportion varying from 5 to 12 parts of morphine to every 100 parts of opium.

**Characters.** White colourless needles, with an alkaline reaction; soluble in alcohol, very slightly so in ether and water.

## SALTS OF MORPHINE

THE ACETATE, HYDROCHLORIDE, AND TARTRATE.



## MORPHINÆ ACETAS

## MORPHINE ACETATE

**Formula.**  $C_{17}H_{19}NO_3, C_2H_4O_2, 3H_2O$ .

**Source.** Made by neutralising morphine with acetic acid.

**Characters.** A white powder, soluble in water and spirit.

**Preparation.** Liquor morphinæ acetatis.

## MORPHINÆ HYDROCHLORIDUM

## MORPHINE HYDROCHLORIDE

**Formula.**  $C_{17}H_{19}NO_3, HCl, 3H_2O$ .

**Source.** The hydrochloride of an alkaloid obtained from opium.

**Characters.** White acicular crystals of silky lustre ; soluble in 1 in 24 of water, 1 in 50 of alcohol (90 per cent.), 1 in 8 of glycerin.

**Preparations.** Liquor morphinæ hydrochloridi, trochiscus morphinæ, and others.

## MORPHINÆ TARTRAS

## MORPHINE TARTRATE

**Formula.**  $(C_{17}H_{19}NO_3)_2, C_4H_6O_6, 3H_2O$ .

**Source.** May be obtained by the combination of morphine and tartaric acid.

**Characters.** A white crystalline powder, soluble in 1 in 11 of cold water, not in alcohol.

**Preparations.** Injectio morphinæ hypodermica, liquor morphinæ tartratis.

## THE ALKALOID MORPHINE AND ITS SALTS

**Pharmacology.** These are anodyne, hypnotic, sedative, and antispasmodic in their action.

**General Therapeutics.** The alkaloid being only sparingly soluble in water, the more soluble salts are usually prescribed. They are given for the relief of pain from any cause, to induce sleep, and to subdue irritation in various organs. In such cases morphine is best administered in the form of the hypodermic injection, which is made from the tartrate, as this salt is more soluble than the others. It should be remembered that its use frequently leads to the "morphine habit," which, once formed, is difficult to overcome.

They are also given as sedatives to the stomach in painful gastralgia, and spasmodic cough may be relieved by the morphine lozenges.

For the relief of severe cases of neuralgia, morphine may be given internally in doses of 10 to 15 minims of the liquor morphinæ hydrochloridi, or by means of the hypodermic injection. When used in the latter form it not only affords temporary relief, but at times it may bring about a cure if employed regularly every day. The injections need not of necessity be made over the seat of pain on account of the disfigurement that might ensue.

**Dental Therapeutics.** As an anodyne the salts are used in devitalising preparations to modify the irritant action and prevent the intense pain which follows the application of arsenic to a pulp. For this purpose the acetate or hydrochloride is preferable.

Combined with carbolic acid, clove oil or creosote

it will often relieve odontalgia when applied to carious cavities :

Acetate of morphine. . . . 20 grains.

Creosote . . . . . 2 drachms.

This same preparation is also used for obtunding sensitive dentine.

**Doses.** Acetate, hydrochloride and

tartrate . . . . .  $\frac{1}{8}$  —  $\frac{1}{2}$  gr.

The solutions . . . . . 10 — 60 mins.

Hypodermic injection. . . . 2 — 5 „

The latter should be carefully distinguished from the injectio morphinæ acetatis hypodermica of Martindale, which is nearly four times stronger than the official preparation.

**Antidotes.** Same as opium.

## MYRRHA

### MYRRH

**Natural Order.** Amyridaceæ.

**Source.** A gum-resinous exudation from the stem of *Balsamodendron myrrha*.

**Characters.** Obtained in the form of irregular-shaped tears or masses, which vary in size, and are of a reddish yellow or reddish brown colour. It has a fragrant odour and a bitter, aromatic taste. The powder is of a light yellow colour.

**Preparation.** Tinctura myrrhæ.

**Pharmacology.** It is an astringent, stimulant, sialogogue and mild disinfectant.

**Oral Therapeutics.** *As an astringent and local stimulant.* The powder is used as an ingredient of dentifrices in the proportion of 1 to 2 drachms to 2 ounces

of precipitated chalk. The tincture is most useful as a mouth-wash in most kinds of ulceration and inflammation of the mouth and gums, combined with borax.

The following prescription is very serviceable for spongy gums, both before and after the extraction of loose teeth :

Borax . . . . .	4 drachms.
Tincture of myrrh . . . . .	4 „
Rose-water to . . . . .	10 ounces.

To be used as a mouth-wash.

**Doses.** 10 to 30 grains. Of the tincture,  $\frac{1}{2}$  to 1 drachm.

## NUX VOMICA

### NUX VOMICA

**Natural Order.** Loganiaceæ.

**Source.** The seeds of *Strychnos nux vomica*.

**Characters.** They are rounded in shape, an inch or more in diameter and about  $\frac{1}{4}$  inch thick ; flattish or concavo-convex ; no odour, bitter taste. They contain two alkaloids, strychnine and brucine.

**Preparations.** Extractum nucis vomicæ.

„	„	„	liquidum.
Tinctura	„	„	

**Pharmacology.** The action of nux vomica is chiefly due to the strychnine it contains. The latter drug is antiseptic, and brucine is anæsthetic ; but both are too poisonous for these purposes, as they are tetanisers of the spinal cord. It is a bitter stomachic, nervine tonic and spinal stimulant.

**General and Oral Therapeutics.** It is given in various forms of paralysis as a nervine tonic, also in neuralgia.

It is one of the best antidotes to poisoning from chloral, but all the other methods of recovery must be persevered with.

*As a tonic.* The tincture in doses of 10 to 15 minims is useful in neuralgia of a hysterical nature; great care, however, should always be taken when ordering it, as small doses have been known to give rise to serious symptoms.

<b>Doses.</b> Of the tincture	.	.	5	— 15 mins.
„ extract	.	.	$\frac{1}{4}$	— 1 gr.
„ liquid extract	.	.	1	— 3 mins.
Strychnine	.	.	$\frac{1}{60}$	— $\frac{1}{15}$ gr.

**Symptoms of Poisoning.** Twitching of the muscles of the limbs, a constricted feeling in the chest, dysphagia, violent convulsions and rapid death by exhaustion and asphyxia. The diagnosis of strychnine poisoning from idiopathic tetanus is that, in the former, there is complete relaxation of the muscles between the convulsive seizures, the rapidity of their course and the comparative absence of trismus (lockjaw). In traumatic tetanus, trismus comes first and life may be prolonged for several days, whilst in strychnine poisoning the patient either dies or is out of danger in a short time. There are, however, many other diagnostic signs, for which the reader is referred to works on pharmacology, etc.

**Antidotes.** Emetics, administration of chloroform or ether, animal charcoal *ad lib.*, chloral hydrate in  $\frac{1}{2}$  drachm doses combined with the bromides in large doses, inhalation of amyl nitrite.

It is not wise to use the stomach-pump, as the passing of the tube might cause tetanic spasms.

## OLEUM CAJUPUTI

## CAJUPUT OIL

**Natural Order.** Myrtaceæ.

**Source.** The oil distilled from the leaves of the *Melaleuca leucadendron*.

**Characters.** It is transparent, limpid and of a bluish-green colour, with a camphoraceous odour and bitter taste. Sp. gr. 0·922 to 0·930. Readily soluble in alcohol. It is a solvent of gutta-percha.

**Pharmacology.** Externally it is a stimulant, counter-irritant and anodyne; internally an antispasmodic, carminative and diaphoretic.

**General Therapeutics.** It is given in neuralgic affections, hysteria, etc.

**Dental Therapeutics.** *As an anodyne.* A drop or two on cotton-wool may relieve toothache if placed in a carious cavity. For neuralgia it may be employed both externally and internally, but its use is contra-indicated if there is any inflammatory action present, as it would tend to increase it. Combined with morphine in the following proportions :

Morphine acetate	.	.	.	5 grains,
Cajuput oil	.	.	.	1 drachm,

and applied on cotton-wool to painful gums after extraction, the pain is greatly lessened.

**Dose.**  $\frac{1}{2}$  to 3 drops.

## OLEUM CARYOPHYLLI

## CLOVE OIL

**Natural Order.** Myrtaceæ.

**Source.** A volatile oil distilled from cloves.

**Characters.** It is a clear and almost colourless fluid when fresh, but becomes yellowish by exposure and ultimately reddish brown. It contains tannic acid, a pungent volatile oil, resin, and two substances, caryophyllin and eugenol, the latter being called an acid, as it possesses acid properties. Sp. gr. 1·050 to 1·065. Soluble in spirit or ether.

**Pharmacology.** It is an antiseptic, obtundent of sensitive dentine, aromatic and carminative, counter-irritant and sialogogue.

**General Therapeutics.** Employed in atonic dyspepsia, and to relieve flatulence.

**Dental Therapeutics.** *As an antiseptic.* It is used by some as a dressing in the treatment of dead teeth by passing strands of cotton-wool soaked in the oil into the canals, but other antiseptics are preferable.

As an ingredient of dentifrices, both as an aromatic and antiseptic, in the proportion of 6 to 8 drops to 2 ounces of precipitated chalk and other drugs, it is both pleasant and useful.

*As an anodyne.* It often relieves toothache if a drop or two on cotton-wool be introduced into a carious cavity. At first severe pain is felt, but this gradually subsides and the patient gets relief, which, however, as a rule, is only temporary. When applied to an irritable pulp it obtunds the pain by an over-stimulating effect.

*As an obtundent.* It allays the pain of sensitive



dentine, either when used alone or combined with tannic acid. If used for this purpose it is best to well swab the cavity out with the oil, allowing it to remain for five minutes; then dry with the hot-air syringe, fill with temporary gutta-percha and wait for a few days, before further excavation.

**Other Dental Uses.** In microscopy it has been used as a clearing agent, but sections so treated have a special tendency to lose colour after mounting.

**Dose.**  $\frac{1}{2}$  to 3 minims.

## OLEUM CINNAMOMI

### CINNAMON OIL

**Natural Order.** Lauraceæ.

**Source.** It is distilled from cinnamon bark.

**Characters.** Is of a yellow colour when fresh, afterwards red. It will disguise the odour of iodoform. Sp. gr. 1.025 to 1.035.

**Pharmacology.** It is a carminative, astringent and antiseptic.

**Dental Therapeutics.** *As an antiseptic.* Opinions vary as to its power as a germicide in the treatment of dead teeth, but most practitioners are agreed that its use should be confined to back teeth on account of the discoloration it causes; therefore, unless one is treating an incisor or canine *root* for crowning purposes, this drug should not be used for front teeth. These remarks also apply to oil of cassia, which is practically the same as cinnamon but contains more cinnamic aldehyde. Professor Miller used to consider cinnamon oil superior

to all other essential oils for the treatment of dead teeth. Grayston recommends (based on a method of Dr. Harlan's) at the first sitting opening up the tooth, clearing out the pulp-chamber only and placing in it a ball of cotton saturated with the oil and filling with temporary gutta-percha, making two or three small holes through the filling for the escape of the gases of putrefaction. At the second sitting the canals are partially or wholly cleansed and the oil worked into them. At the third sitting repeat this, only make no holes in the temporary stopping, and should the tooth be perfectly comfortable after three or four days the roots may be filled and the case completed.

It is employed as an ingredient of tooth-powders for its antiseptic properties, in the proportion of about 5 drops to 2 ounces of precipitated chalk.

**Dose.**  $\frac{1}{2}$  to 3 minims.

## OLEUM EUCALYPTI

### OIL OF EUCALYPTUS

**Natural Order.** Myrtaceæ.

**Source.** An oil distilled from the fresh leaves of the *Eucalyptus globulus*, *E. amygdalina*, and other species.

**Characters.** It is colourless when fresh, but becomes darker and thicker by exposure. Odour aromatic, flavour spicy and pungent. Soluble in alcohol. Sp. gr. 0.910 to 0.930. It is a solvent of gutta-percha.

**Pharmacology.** It is an antiseptic, disinfectant, antipyretic, antiperiodic, sialogogue and slight astringent, this latter property being due to the presence of tannic acid. It possesses none of the irritating pro-

perties of carbolic acid or creosote and is not a caustic. It is certainly highly destructive to all low forms of animal life.

**General Therapeutics.** It is given in ague, typhoid fever, septicæmia and pneumonia.

**Dental Therapeutics.** *As an antiseptic.* It is used for this purpose in the treatment of dead teeth, either alone or with iodoform or iodol, the latter for preference on account of the disagreeable odour of the former. But it must be remembered that it has very little penetrating power on account of its viscosity. In either case the drug or drugs can be introduced into the canals by means of a fine brooch around which is wrapped some cotton-wool, and the cavity sealed with gutta-percha, but in using this as a temporary filling it should always be borne in mind that eucalyptus oil is a solvent for it. The rubber dam should be first applied and all means taken to prevent the presence of moisture.

As a root dressing in combination with gutta-percha its use is questionable on account of its solvent action. It is much better to render the canals aseptic with some other drug, such as mercuric chloride or formalin, and fill with chloro-percha.

It is often included in dentifrices in the proportion of 5 to 10 drops to 2 ounces of precipitated chalk, with other ingredients.

*As an astringent.* The tincture (unofficial) can be used for ulcerated and spongy gums.

**Doses.** Of the oil . . .  $\frac{1}{2}$  — 3 minims.  
 ,, tincture . 15 mins. to 2 dr.

It is one of the ingredients of euthymol and listerine.

## OLEUM GAULTHERIÆ

(NOT OFFICIAL)

OIL OF GAULTHERIA

**Natural Order.** Ericaceæ or Betulaceæ.

**Synonym.** Oil of wintergreen.

**Source.** The oil distilled from the leaves of the *Gaultheria procumbens* or from the bark of the sweet birch, *Betula lenta*.

**Characters.** It is a fragrant smelling oil which is colourless or slightly yellowish, and contains nearly 99 per cent. of methyl-salicylate.

**Pharmacology.** It is an antipyretic, antiseptic, counter-irritant and a flavouring agent.

**General and Oral Therapeutics.** It is used externally for painful affections of a rheumatic nature, and as a mouth-wash on account of its antiseptic properties and for its agreeable and pleasant taste. It is one of the ingredients of listerine and eucalyptol.

**Dose.** 3 to 10 minims.

## OLEUM MORRHUÆ

COD-LIVER OIL

**Class.** Pisces. Order : teleostei.

**Description.** The oil obtained from the livers of the cod (*Gadus morrhua*), which is of a pale yellow colour ; odour and taste fishy.

**Pharmacology.** It is a nervine tonic and hæmatinic and acts as a food, but its action in each respect is undetermined. It builds up the tissues, repairs waste, and supplies nervous, muscular and digestive power.

**General and Oral Therapeutics.** It is extensively used

in all kinds of chronic disease attended by wasting, such as scrofula, chronic phthisis, rickets and hereditary and tertiary syphilis.

*As a nervine tonic.* It is of great value in neuralgia occurring in weak and debilitated people. It should always be prescribed for children when from the condition of the teeth, ends of the bones, glands, etc., the patient is seen to be suffering from rickets. In such cases it can be combined with the syrup of iron phosphate in drachm doses of each, the cod-liver oil being gradually increased to 4 drachms, according to the assimilative power of the drug.

**Dose.** 1 to 4 drachms. It should always be given *after* meals. If it be persistently rejected it should be stopped for a time or given with ether (10 minims of pure ether to 1 drachm of oil) or as an emulsion.

## OLEUM TEREBINTHINÆ

### OIL OF TURPENTINE

**Natural Order.** Coniferæ.

**Synonyms.** Spirits of turpentine, "turps."

**Source.** It is an oleo-resin obtained from the various species of pine.

**Characters.** It is a colourless limpid liquid with a strong penetrating peculiar odour and a bitter pungent taste. Insoluble in water; soluble in ether, absolute alcohol and chloroform. Sp. gr. 0.864.

**Preparations.** Linimentum terebinthinæ and linimentum terebinthinæ acetum.

**Pharmacology.** It is an antiseptic, disinfectant, counter-irritant, vesicant, anthelmintic, hæmostatic and antidote to phosphorus.

**General Therapeutics.** Used externally as an irritant or counter-irritant in various forms of chronic inflammation, in neuralgia, myalgia and pains of a rheumatic nature. Given internally for arresting hæmorrhage and as a carminative and stomachic.

**Dental Therapeutics.** *As an antiseptic* it has been used in the treatment of dead teeth, but the author has never used it for this purpose. Sanitas oil, which is obtained from oil of turpentine by oxidation, has also been advocated for the same purpose.

*As a counter-irritant* it is used in the form of a liniment for the relief of neuralgia, and the following is a useful prescription :

Turpentine liniment	.	.	.	1 ounce.
Solution of ammonia	.	.	.	1 „
Cajuput oil .	.	.	.	$\frac{1}{2}$ „
Oil of lemons	.	.	.	1 drachm.
Olive oil to .	.	.	.	4 ounces.
(Murrell.)				

*As a hæmostatic* it may be given internally in doses of 1 drachm at first and followed every two hours by doses of 20 to 30 minims in severe cases of alveolar hæmorrhage. It should be remembered that it must never be given where there is Bright's disease, as it causes inflammation of the kidneys.

**Doses.** 2 to 10 minims. As an anthelmintic 2 to 4 drachms may be given.

**Symptoms of Poisoning.** Odour in breath, intoxication, contracted pupils, stertorous breathing, coma, collapse and tetanic convulsions, irritability of bladder, the urine having the odour of violets.

**Antidotes.** Stomach-pump or emetics and demulcent

drinks. Should there be much pain a hypodermic injection of morphine can be given.

*Terebinthinæ Canadensis*. **Synonym.** Canada balsam (though it is not a true balsam).

This possesses the same properties as turpentine oil, but is only used for its physical qualities. In dental microscopy it is employed for mounting specimens.

## O P I U M

### OPIUM

**Natural Order.** Papaveracæ.

**Source.** The juice obtained by incision from the unripe capsules of the *Papaver somniferum*, the white poppy, inspissated by spontaneous evaporation.

**Characters.** Seen as rounded irregular masses, weighing from 8 ounces to 2 pounds, and enveloped in the remains of poppy leaves; has a strong narcotic odour and a bitter taste. It contains many alkaloids, such as morphine, codeine and thebaine.

**Preparations.** These are very numerous but only the tincture (laudanum) is used by dentists.

**Pharmacology.** It is an anodyne, astringent, anti-sialogogue, narcotic, and in the form of Dover's powder, a diaphoretic and antispasmodic. Its action depends chiefly on the morphine it contains. It excites and stimulates the circulation at first and causes an exhilaration of the mental faculties, which is succeeded by depression and sleep. It has a paralysing effect on the bowels and is a powerful depressant upon the respiratory functions.

**General Therapeutics.** It is employed to induce sleep, relieve pain and calm excitement. It is given in cases of



neuralgia, rheumatism, sciatica, the passing of renal and biliary calculi, and other painful conditions. In ptyalism it is given to correct the excessive flow of saliva.

Certain influences modify the action and uses of opium. These are :

(1) *Idiosyncrasy*, which renders some patients unduly susceptible to the action of the drug whilst others resist it.

(2) *Habit*. The opium habit is not at all uncommon. Patients who once contract this not only have great difficulty in getting out of it, but, to obtain the ordinary effects of the drug, gradually increasing doses must be taken, till at last the individual can take what would be a poisonous dose without any ill effects.

(3) *Age*. Children bear it badly. "Teething powders" generally contain opium, and in consequence should be avoided.

(4) *Disease*. Its use is contra-indicated in diseases of the respiratory organs, the heart and the kidneys, in congestion and hyperæmia of the brain and in alcoholic intoxication. In a good many cases it is preferable to give it in the form of morphine.

**Dental Therapeutics.** *As an anodyne.* A piece of opium or cotton-wool saturated in the tincture placed in a carious cavity will at times relieve odontalgia, should no other remedies be at hand.

**Doses.** Of opium . . .  $\frac{1}{2}$  — 2 grains.

„ the tincture . . . 5 — 15 minims for repeated administration,  
20 — 30 for single dose.

**Symptoms of Poisoning.** Deep sleep, stertorous breathing, contracted pupils, feeble pulse, convulsions, coma and death.

**Antidotes.** Stomach-tube, keep the patient walking about if possible, cold affusion, irritation of the skin, strong coffee, stimulants (not alcoholic), galvanic shocks, the hypodermic injection of ether or atropine ( $\frac{1}{20}$  gr.). Artificial respiration. It is much better to empty the stomach with the stomach-tube than with emetics, as the vomiting centre is generally too weak from the action of the opium to act effectively.

## PAPAVERIS CAPSULÆ

### POPPY CAPSULES

**Natural Order.** Papaveraceæ.

**Description.** The *nearly ripe* dried capsules of *Papaver somniferum* (the white poppy), which are globular in shape, from 2 to 3 inches in diameter and of a light brown colour. Inodorous and slightly bitter.

**Pharmacology.** They are sedative and anodyne in their action like that of opium, but much weaker.

**Dental Therapeutics.** *As an anodyne.* The capsules are used as a fomentation for the relief of pain after tooth extraction or where a tooth has been badly fractured and the root left in, or where the alveolus has been fractured and the gum lacerated. In such cases direct the patient to obtain six poppy capsules, break them up, add one quart of water and boil down to a pint. This should be used frequently *in the mouth* as hot as possible, the patient being told at the same time not to swallow any. Some warm antiseptic mouth-wash such as listerine, glycothymoline or euthymol should be used alternately with the fomentation. In the cases just mentioned the pain not only of the operation, but of the subsequent periostitis is very great,

and the poppy capsules used in this way, if not absolutely removing the pain, will certainly afford relief.

**Antidotes.** Same as Opium.

## PEPSINUM

### PEPSIN

**Source.** Made by scraping the cleansed mucous membrane of the fresh and healthy stomach of the pig, sheep or calf, drying the viscid pulp on glass at 100° F., and pulverising.

**Characters.** A light, yellowish brown powder with a faint odour and bitter taste. Sparingly soluble in water or alcohol.

**Pharmacology.** It is a great aid to digestion and has antiseptic and deodorising powers.

**General Therapeutics.** It is employed in dyspepsia, gastralgia and irritable conditions of the stomach with vomiting, such as ulcer and cancer. It is a valuable agent in the different forms of nutrient enemata.

**Dental Therapeutics.** *As an antiseptic.* It has been used in the treatment of dead teeth and ulceration of the pulp. In the latter condition, where it is advisable to try and save the pulp, it is said to stop the offensive secretion and induce healthy action. It should be used in the form of a paste, introduced into the cavity and left in for three days. One or two applications may be necessary. The paste to be used is as follows :

Hydrochloric acid	.	.	.	1 drop.
Water	.	.	.	40 drops.
Pepsin	.	sufficient quantity to make a paste.		

It is seldom used now for dental purposes.

**Dose.** 5 to 10 grains.

## PYRETHRI RADIX

## PYRETHRUM ROOT

**Natural Order.** Compositæ.

**Synonym.** Pellitory root.

**Source.** The dried root of the *Anacyclus pyrethrum*.

**Characters.** Seen in the form of unbranched pieces 2 to 4 inches long,  $\frac{1}{2}$  to  $\frac{3}{4}$  inch thick. Inodorous, but has an acid taste.

**Preparation.** Tinctura pyrethri.

**Pharmacology.** It is an irritant and sialogogue. When chewed it causes a burning and tingling sensation in the mouth and throat and a copious flow of saliva.

**General and Dental Therapeutics.** It is used as a mouth-wash in cases of "dry" throat and mouth. In certain neuralgic affections of the face it is said to give relief when chewed.

A few drops of the tincture applied on cotton-wool to an irritable pulp will at times relieve odontalgia. For relaxed conditions of the mucous membrane of the mouth and gums the following can be used :

Tincture of pyrethrum . . . . .	3 drachms.
Water to . . . . .	8 ounces.

To be used as a mouth-wash.

Small quantities give a pleasant taste to tooth powders.

**Dose.** It is not given internally.

## QUILLAIÆ CORTEX

## QUILLAIA BARK

**Natural Order.** Rosaceæ.

**Synonyms.** Soap bark, Panama bark.

**Description.** It is the bark of the *Quillaia saponaria* and is imported in flat pieces two to three feet long and several inches wide ; is hard and tough ; contains *saponin*.

**Pharmacology.** It is a detergent and errhine. When used in the oral cavity it causes a froth to form.

**Dental Therapeutics.** *As a detergent.* It is used as an ingredient of mouth-washes for chronic ulcers of the mouth and to check excessive secretion of the mucous membrane. For this purpose it is best used in the form of the valoid fluid extract in the proportion of one teaspoonful to a pint of water.

## QUININÆ SULPHAS

## QUININE SULPHATE

**Natural Order.** Cinchonaceæ.

**Formula.**  $(C_{20}H_{24}N_2O_2)_2 \cdot (H_2SO_4)_2 \cdot 15H_2O$ .

**Source.** It is an alkaloid obtained from the powder of various kinds of cinchona and remijia bark.

**Characters.** Snow-white feathery crystals with a bitter taste ; only slightly soluble in water, soluble in alcohol and the dilute acids.

**Pharmacology.** It is a tonic, stimulant, antiperiodic, antiseptic and antipyretic. When given in large doses it causes symptoms of cinchonism, such as buzzing

in the ears, headache, deafness, vertigo (patients will complain that they feel as if their head would split), disorders of vision, coma and convulsions. Some people cannot take it, the smallest dose causing headache.

**General and Dental Therapeutics.** The former are far too numerous to mention in detail in a dental work. Briefly speaking, one of its chief uses is as an antipyretic in many of the acute specific fevers, as in large doses (15 grains) it lowers the temperature. Smaller doses given at shorter intervals do not have this effect, as it is not accumulative in its action. It is said to be a preventative of influenza if taken in 2 to 3 grain doses every morning during an epidemic.

The indications for its use, in some forms of neuralgia, are :

- (1) That the pain is supra-orbital.
- (2) That it is periodic.
- (3) That there is a history of malarial disease (Murrell).

It is used locally as a gargle in cases of putrid sore throat, aphthous ulceration and scurvy. This may be combined or not with the internal administration of the drug.

*As an antiperiodic.* It is given in cases of neuralgia in doses of 1 to 10 grains with good effect. This may be due to its tonic action, as quinine has no direct action on the peripheral nerves. If the neuralgia be of malarial origin it will bring about immediate relief in doses of 5 grains.

*As a tonic.* It is given in cases of cancrum oris, though the author thinks preference should be given to cinchona bark and ammonium carbonate, more particularly

when nitric acid has been used as a local application (see page 66).

**Dose.** 1 to 5 grains as a tonic, 5 to 20 grains as an antipyretic and antiperiodic.

## SINAPIS

### MUSTARD

**Natural Order.** Cruciferae.

**Description.** A greenish yellow powder made from mixing black and white mustard seeds which have been powdered. It has a penetrating, pungent odour and is very irritating to the nostrils and eyes.

**Pharmacology.** Applied externally in the form of a poultice or plaster it is a rubefacient and counter-irritant, causing redness, heat and severe pain, and if its application be prolonged it causes vesication. It is one of the most useful emetics we have, as it is nearly always at hand.

**General and Dental Therapeutics.** *As an emetic.* In narcotic poisoning it is most valuable, it having a rapid stimulant action and causing very little after-depression. From one to four teaspoonfuls may be well stirred up in a tumbler of warm water for this purpose.

*As a counter-irritant.* It can be used in the form of a "flying" blister to the face in cases of neuralgia, which it will relieve, although the pain in the tooth will remain if that has been the cause of the neuralgia.

Mustard "leaves" are a very convenient substitute for the mustard poultice.



# T H Y M O L

## THYMOL

**Natural Orders.** Labiatae and Umbelliferae.

**Formula.**  $C_{10}H_{13}HO$ .

**Source.** A stearoptene obtained from the volatile oils of *Thymus vulgaris*, *Monarda punctata* and *Carum copticum* by saponification with caustic soda, and treating the soap with hydrochloric acid. Purified by recrystallisation from alcohol.

**Characters.** Large oblique prisms, with an aromatic odour. Freely soluble in alcohol and ether, sparingly so in water.

**Pharmacology.** It is an antiseptic, anti-putrefactive, local anæsthetic and disinfectant. Its action is similar to that of carbolic acid, but it is less irritating.

**Dental Therapeutics.** *As an antiseptic.* It is employed for suppuration and chronic inflammation of the pulps of teeth, also in the treatment of the roots of dead teeth and for alveolar abscesses. It is sometimes used as an ingredient of devitalising pastes on account of its local anæsthetic effect. Dr. Miller recommends the following :

Thymol	}	.	.	.	of each 10 grains.
Arsenic					

Clove oil, sufficient quantity to make a paste.

One disadvantage of this mixture is that part of the thymol separates from the arsenic in crystalline form, rendering it necessary to stir the paste from time to time.

The following is a thymol dentifrice :

Precipitated chalk	.	.	.	℥ii.
Thymol	.	.	.	gr. x.
Saccharin	.	.	.	gr. iv.
Potassium bicarbonate	.	.	.	℥ii.

**Dose.**  $\frac{1}{2}$  to 2 grains.

It is one of the ingredients of listerine and euthymol.

## TRAGACANTHA

### TRAGACANTH

**Natural Order.** Leguminosæ.

**Source.** A gummy exudation obtained by incision from *Astragalus gummifer*.

**Characters.** White or yellowish inodorous and tasteless flakes, sparingly soluble in cold water.

**Preparations.**

- (1) Glycerinum tragacanthæ (used as a pill excipient).
- (2) Mucilago tragacanthæ.
- (3) Pulvis tragacanthæ compositus.

**Pharmacology.** It is a demulcent and protective.

**General and Dental Therapeutics.** It is very soothing when applied to sore throats or any raw conditions of mucous surfaces. Powdered tragacanth is used in dentistry as a means of helping to secure adhesion of upper artificial "suction" dentures. It is well known that *at first* some dentures will not stop up, but the sticky nature of tragacanth gives confidence to a patient who has never previously worn one. Then, too,

full lowers where there is little or no ridge “wobble about” and knock an otherwise perfectly fitting upper denture down, so that its use for the lowers is equally efficacious. This is also applicable when “taking a bite.”

**Doses.** Of the mucilage . . . 1 — 4 dr.  
 ,, compound powder . . . 20 — 60 gr.



LOCAL AND PRESSURE  
ANÆSTHESIA



## LOCAL ANÆSTHESIA

WHEN carried out with proper care and attention to all details, local anæsthesia by injection is of great use in the extraction of teeth. It renders the operation entirely painless, and has what is to some patients a tremendous advantage over general anæsthesia from the inhalation of nitrous oxide—namely, the fact that the patient does not lose consciousness during the operation. It is, however, quite a mistake to think that this local anæsthesia can be effected in a shorter space of time than is the case with the administration of nitrous oxide. One of the most important factors in making the treatment successful is that of allowing plenty of time, both during the injection and after the injection is complete, prior to performing the extraction.

Great attention must be paid to asepsis. The instruments should be sterilised immediately before use. The mouth should be thoroughly washed with an antiseptic mouth-wash, and a freshly prepared solution of the drug to be injected is essential.

Always use a good quality syringe, and see that it does not leak. When the syringe is filled ready for injecting, make sure that no bubbles of air are left in the needle. Inject into firm tissue, making the needle go in the direction of the apex of the root, and take especial notice that the drug does not escape from the tissues either during the injection or afterwards when



the needle is withdrawn. It is advisable to allow some seconds to elapse after each 3 or 4 minims are injected, and to allow half a minute after the completion of the injection before removing the needle, so that the drug will penetrate the deeper tissue and will not be forced out by the extra pressure in the gums along the channel made by the needle. Always allow time to elapse after the injection before operating, five or ten minutes being necessary where bad inflammation is present or where there is reason to expect abnormally long roots.

Alypin or novocain are the most suitable drugs to use for obtaining dental analgesia. For the doses and forms of which see pages 151, 175. Whichever drug you select for injection, it is important that a vaso-constricting substance be used in conjunction with it, adrenalin being the best. This is not so much to reduce hæmorrhage after the extraction, but to limit the area into which the drug is injected.

Before operating make sure that the anæsthesia has taken effect by beginning cautiously. If the patient feels pain, inject again; a very few minims will complete the anæsthesia.

Generally speaking, local anæsthesia is of most use in dental surgery for the extraction of a limited number of teeth, general anæsthesia by the inhalation of ether being preferable where extensive extractions are to be made. It is generally more successful in the maxilla than in the mandible.

It is of frequent use when excavating sensitive teeth, the injection being carried out with just as great an amount of care as for extraction.

It is important to remember that novocain and alypin become decomposed by some of the usual agents

used to sterilise the syringe; so that should they be used it is essential that all trace of them be removed from the syringe before filling it with either of these two drugs, or better still, use an antiseptic to sterilise the syringe which will not affect them.

The chief drugs used for local anæsthesia as applied to tooth extraction, are, alypin, cocaine, codrenine, eucaine, eudrenine, neurocaine, novocain, etc. There are also numerous preparations on the market, for which their makers all claim certain advantages.

### PRESSURE ANÆSTHESIA

For extirpation of the pulp, pressure anæsthesia has to a great extent superseded the devitalising method. Time, which is a consideration both to the operator and to the patient, is saved, and the inconvenience of repeated visits obviated.

The principle of the treatment is that a drug is made to permeate the tissues of the pulp by means of mechanical pressure, thereby inducing anæsthesia of the pulp, which may then be drilled into and removed with a bristle without pain. The drugs mainly used for this purpose are crystals of cocaine hydrochloride, novocain, neurocaine, etc., the last of these being exceedingly easy in manipulating and very efficacious. The mechanical pressure employed is obtained by the steady kneading of ordinary red rubber rendered soft by slight warming.

The following is a brief *résumé* of the important points to remember in connection with this form of treatment.

You must obtain as large an actual exposure as is at all possible. Dry the cavity thoroughly after having

protected the tooth from the saliva, preferably with rubber-dam. Place whatever drug you are using upon the actual exposure; cover this with a small wisp of wool moistened in adrenalin and formalin. Having softened a small piece of red rubber, seal the cavity with it round the edges. Take a flat-headed instrument and with great care proceed to press the rubber towards the exposure. It is important to use a flat-headed instrument as it is less likely to cause suction in the pulp cavity when you draw the instrument back from the rubber, which would give intense pain. Very gradually increase the amount of pressure, until finally the instrument may be pushed hard against the exposure without causing any pain. When this stage is reached remove the rubber and wool from the cavity, open up the pulp chamber, and extract the pulp in the ordinary way.

It may be found necessary to repeat the process in some cases before the entire pulp can be removed.

It is not of much use to follow this mode of treatment either in cases where acute pain is at the time being suffered, the pulp being in too inflamed a state, or where direct access to the point of exposure is unobtainable.

Fill the root immediately after stopping any bleeding that may occur after the removal of the pulp, selecting a non-irritant material. The slight periostitis which may result will soon pass away.

In some cases pressure treatment is of great service in allaying the pain caused by excavating sensitive dentine.

The four best drugs to use for pressure anæsthesia are, alypin, cocaine, novocain, and neurocaine. The latter is perhaps the best on account of the convenient shape of the "billets."

THE MUMMIFICATION OF  
THE PULP



## THE MUMMIFICATION OF THE PULP

IF one could only be sure of aseptically preserving the pulp in a dry and hardened condition, much time and trouble would be saved to both patient and operator. In some cases this is done, but we cannot be *certain* of it. One knows perfectly well that complete extirpation of the pulp with proper treatment and filling of the canals is the best procedure. But at times this is absolutely impossible. Twisted roots and distal cavities in molars at times render this form of treatment mechanically impossible.

The term "mummification of the pulp" is to a certain extent a misnomer, as in a great majority of cases it is only that part of the pulp remaining in the canals that requires mummifying.

In some cases root canals are so very small that it is practically impossible to get a brooch into them, much less a drill; and at other times, whatever the size of the canal and however easy it may be to get at it, it is found to be "twisted," or we presume so, and to use a drill in such cases would be simply "looking for trouble." Then, again, with distal cavities in molars, where there is an exposure and devitalisation is necessary, the arsenic may not completely effect this process; and the same may be said where "pressure anæsthesia"

has been used. In all such cases the application of a proper mummifying agent is to be advocated.

Now, amongst the drugs used for this purpose is tannic acid, but this is only applicable where arsenic has been applied to devitalise and the tannin used to harden the pulp to facilitate its removal. This is quite a different matter to using a drug which will preserve the pulp aseptically without shrinkage; for if this latter condition occurs, gases may form which would cause apical trouble; and the same may be said if strong irritants such as formalin are used for this purpose. Then, too, a drug like mercuric chloride could not be used for front teeth, as it would cause discoloration.

From these remarks it will be seen that no individual drug can be used by itself as a mummifying agent, and we have now several mummifying pastes on the market. The best of these, in the author's opinion, is "Trio." This is made from a formula of Professor Gysi, of Zurich, who for years past has made many interesting experiments on this subject; and he claims for "Trio" that it possesses (1) a quick penetrating oily antiseptic which sterilises the remains of the pulp in a very short time; (2) slow-acting coagulants to harden the pulp without producing shrinkage; (3) practically insoluble antiseptics for the permanent mummifying of the pulp.

In all cases, whatever preparation is used to mummify that portion of the pulp remaining in the canals, the pulp cavity itself must be entirely cleared. By some this is called amputation of the pulp. This not only provides room for the necessary quantity of paste but leaves the cavity entirely free for a permanent filling.



When it is decided to mummify, it is best not to "test" whether the remains of the pulp are dead or alive with nerve extractors, as this would be liable to interfere with the proper diffusion of the agent.

After the application of a paste, it should be covered with one of the osteoplastic fillings. Professor Boenneken, of Prague, recommends a paste consisting of coeaine, thymol, formalin, and zinc oxide, previously washing out the pulp cavity with a 10 per cent. solution of formaldehyde—*i.e.* one volume of the 40 per cent. formalin to three volumes of water.

Grayston recommends a paste consisting of a small quantity of paraform powder, equal to the amount produced by crushing a cube  $\frac{1}{32}$  of an inch in thickness, an equal quantity of thymol, one drop of clove oil, and zinc oxide sufficient to make a paste of the desired consistency. The preparation should be made fresh for each case, the paraform and thymol being rubbed into the clove oil with a spatula on a mixing slab, when they readily dissolve. The zinc oxide is then added, and if well rubbed in, usually produces a sufficient quantity of paste; if a larger amount is needed to fill the pulp cavity of a molar, a little more zinc oxide and clove oil can be used.

Mummifying pastes are distinctly useful when the right cases have been properly selected (take, say, the case of a first upper bicuspid), but in their indiscriminate use in the hands of a careless operator are liable to lead to alveolar and other troubles.

The following are the chief mummifying agents: Formalin, mercuric chloride, paraform, tannic acid, triformal "mummaloid," "trio," and "pardon."



THE APPLICATION OF  
BACTERIO-THERAPEUTICS  
TO DENTISTRY

BY

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## BACTERIO-THERAPEUTICS

OF late years much attention has been given to the treatment of infective disease by specific methods, which is the adaptation to medical use of the antiseptic principles applied to surgery by Lister.

Lister recognised that suppuration was due to bacteria, and he successfully combated those bacteria by the application of chemical poisons to his wounds—a method which, as is well known, revolutionised surgery. Asepsis is now in vogue, and bacteria are kept out of wounds altogether, all those present in dressings, lotions, and instruments being destroyed by heat before use; but the principles established by Lister remain unshaken.

But the bacteria which cause disease are not limited to those which set up suppuration in wounds; many “medical” diseases, such as phthisis, pneumonia, and typhoid fever, are all due to bacteria, and recovery does not occur unless these bacteria are got rid of.

But antiseptics and asepsis are only applicable to such bacteria as can be exposed to either poisons or heat; and as in medical diseases the bacteria are within the body tissues, neither of these methods is practicable. Heat is clearly out of the question, and all efforts to introduce antiseptics into the circulation,

either by the mouth or by means of injection, have proved failures. There is no drug which can directly influence bacteria in the tissues.

Other means must therefore be sought for if bacteria are to be artificially removed from such situations, and the means adopted is the stimulation of certain physiological properties of the patient's tissues.

It is well known that recovery from bacterial disease frequently occurs without any treatment at all, and it follows that the body must have some power of getting rid of bacteria for itself without external help.

This recovery is due to the fact that the body tissues have elaborated some substance which passes into the blood and exerts a hostile influence on the bacteria, and it depends on the law that *animal tissues elaborate "antibodies" to any foreign albuminous substance introduced into them which is soluble in the tissue fluids.*

For instance, if milk is injected into an animal, antibodies to milk will be made by the animal's tissues, and its blood-serum when added to milk will cause coagulation. In the same way by appropriate experiments the development of antibodies to bacteria can be demonstrated after their injection into an animal. It is found, further, that in natural recovery from bacterial disease the patient's serum has developed anti-bacterial substances, and we proceed on the hypothesis that natural recovery is due to this development.

Advantage is taken of this physiological property in treatment. Two methods are available. In one case an animal is injected with the organisms causing the infection which it is sought to cure, or with their toxins, and when antibodies have been developed, the animal's serum is drawn off and injected into the patient in

order to supply him with the requisite antibodies. This is "scrum therapy."

The second method is most applicable in cases of localised infection, where there is a focus of organisms in a body otherwise fairly healthy. In such cases it is believed that the tissues at the site of infection have been poisoned, and have consequently been unable to make the necessary antibodies. If a culture of the infecting bacteria is obtained, suspended in salt solution, and killed by heat, it may be injected into a healthy part of the body. The bacteria have been killed, so they can produce no infection at this site; but their protoplasm is not appreciably changed, and they stimulate the tissues to produce antibodies to themselves. These antibodies pass into the blood and lymph. They are thus carried all over the body and through the focus of infection, which is thus bathed in a fluid rich in antibodies to the bacteria lodged in it. This lymph acts as an antidote to the bacteria in the lesion.

Such a suspension of killed bacteria, standardised to contain a certain number of bacteria per unit of volume, is known as *vaccine*. Vaccines are much more readily obtainable and, for such purposes, more efficient than sera, and vaccine therapy is the only form of bacterio-therapeutics which is at present applicable to dentistry.

The unit of volume of all vaccines is one cubic centimetre, and they must be labelled as containing so many millions of bacteria per c.c. Different strengths are required for different vaccines.

They are intended for subcutaneous inoculation, and may be injected with a sterile syringe and needle into



any part of the body where the skin is thick; the back of the upper arm is a convenient place. Thin skin, such as that on the front of the forearm, should be avoided.

Dose is regulated in millions of organisms, and the size of the dose suitable for injection is strictly limited; cumulative effects by increase of dose cannot be produced at will, and excessive doses produce bad effects and aggravation of the lesions and no improvement.

The only application of these methods to dentistry which is practicable at the present time is in the treatment of pyorrhœa alveolaris, which is a chronic inflammation of the gum margins and periodontal membrane, resulting in absorption of the surrounding alveolus (Eyre and Payne).

The method of treatment adopted is the isolation of the organism causing the infection from the alveolar pus, the preparation of a vaccine therefrom, and the inoculation of the patient with it. In view of the immense number of micro-organisms which are constantly present in the mouth during health, and the great multiplication of them which occurs in diseased conditions, this is a matter of great difficulty.

Many bacteriologists have made observations on the bacteria of the mouth, but the first important experiments made with a view to the treatment of pyorrhœa by specific means were those of Goadby, who published bacteriological observations from ninety cases in his Erasmus Wilson lecture (*Lancet*, March 9, 1907).

He found twenty varieties of organisms in these investigations, several of which were present in each of his cases. The most prevalent organisms were streptococci, which, however, were present in nearly

all normal mouths ; and staphylococci of various kinds. Neglecting the streptococci as harmless parasites, he investigated a number of staphylococcal cases, and found several varieties of staphylococci. He estimated the patient's resistance to each by Wright's method, known as " the estimation of the opsonic index."

By this means he picked out the infecting organism, and treated his patients with the corresponding vaccine, using doses of 250 millions with satisfactory results.

Eyre and Payne (*Proc. Roy. Soc. Med.*, Odont. Sect., Nov. 22, 1909) have published more varied experiments. They quote Simms, who investigated ten cases of pyorrhœa alveolaris and obtained *micrococcus catarrhalis*, *streptococcus brevis*, *spirilla*, and *bacillus fusiformis* from the pus in every case, and *staphylococci* only occasionally. Of the bacteria constantly present, only streptococci and the *micrococcus catarrhalis* are capable of cultivation. There are several varieties of streptococcus, known as *S. longus*, *S. brevis*, and *S. lanceolatus pneumoniae* (pneumococcus). In view of some work of Washbourn and Goadby to the effect that the *streptococcus brevis* is a harmless parasite, they omitted this, but made observations on the opsonic index of the patients to all the other cocci. Thirty-three cases were investigated, and twenty-six were treated by vaccines, local treatment being also given to the mouth. Inoculations were given at intervals of from one to three weeks over periods which varied from 30 to 272 days. Twenty cases were cured—that is, the pus disappeared, the loose teeth became firm, the general health improved and there was loss of arthritic pain. The usual doses, employed were as follows :

Micrococcus catarrhalis	. 2.5 millions <i>minimum</i> 50 millions <i>maximum</i> . (One case 250 to 500 millions).
Streptococcus longus	. 5 millions <i>minimum</i> 50 millions <i>maximum</i> . (One case 50 to 250 millions).
Pneumococcus	. . . 5 millions <i>minimum</i> 100 millions <i>maximum</i> .
Staphylococcus	. . . 50 millions <i>minimum</i> 250 millions <i>maximum</i> .

They conclude that pyorrhœa alveolaris is not a specific disease, but a condition of suppuration due to one or more of the ordinary pyogenetic bacteria.

The observations of the present writer on twenty-four cases of pyorrhœa suggest some modifications of that conclusion. In the first place, the dismissal of the *streptococcus brevis* from consideration is of questionable wisdom. It is a very sweeping bacteriological statement that any organism is never pathogenic. From observations on the opsonic index, and from the results of treatment by vaccines, he is of opinion that this organism is frequently the cause of pyorrhœa, and he ventures to suggest as a matter of opinion that the principal initial cause of pyorrhœa is infection with the *streptococcus brevis*, which in normal mouths is a harmless parasite, but may become pathogenic in the same way as the *bacillus coli communis* may become so. Upon such a condition other infections are frequently grafted.

Again, when a culture of streptococci from the mouth is examined all the specimens may be short—that is, in chains of eight members or less—but they differ con-

siderably in shape and size; and it may well be that different strains of streptococci are there represented. The present writer has used a mixed stock vaccine of mouth streptococci in such cases, employing initial doses of 25 millions at weekly intervals, increasing gradually to 50 millions, and treating secondary affections as may be required. When local treatment is efficiently carried out, vaccine treatment is generally required for at least six weeks.

To obtain cultures the mouth should be washed out with water, the gum pressed, and a platinum loop passed as far as possible into a pocket between the tooth and the gum. The pus is planted out upon agar slopes, and sub-cultures made until pure growths are obtained. A vaccine takes three or four days to prepare. All the work should be carried out by an experienced person.

This condition of pyorrhœa alveolaris is one which requires anti-bacterial treatment by both medical and surgical methods. There is a septic condition of the mouth which requires treatment by local antiseptics; but organisms are also deeply seated in the tissues, as is evidenced by the occasional occurrence of infections in distant sites—arthritis, choroiditis, and so on. These organisms are out of reach of local antiseptics and require to be attacked through the blood stream.

But it must be borne in mind that unless the mouth is most thoroughly treated, reinfection of the tissues will occur from the bacteria present in the pus in the pockets.

It may possibly not be out of place in this connection to suggest a method whereby the risk of conveying bacteria from an infected to a healthy part of the gum

by means of instruments may be easily avoided. If olive oil is heated to  $140^{\circ}$  C., instruments may be absolutely sterilised by momentary immersion therein. Instruments may be rinsed free of oil in a solution of sodium carbonate and wiped before use. If the oil is heated in a small metal vessel it may be kept hot by means of a gas flame. If no high-temperature thermometer is available, a bread crumb may be placed in the oil, when this turns brown the oil is hot enough; it should not be allowed to exceed this temperature.

The treatment of pyorrhœa alveolaris by means of vaccines has proved, in many instances, a very satisfactory adaptation of the principles of bacterio-therapeutics to dentistry.



## BRIEF NOTES





## BRIEF NOTES

SHORT NOTES OF THOSE DRUGS WHICH ARE OCCASIONALLY USED BY DENTISTS; ALSO OF THOSE USED IN DENTAL MICROSCOPY.

**ACETANILIDE.** *Synonym, Antifebrin.* An anti-pyretic and analgesic. Is given for neuralgia, migraine, periodontitis and pulpitis. It is a depressant of the heart's action, so must be prescribed with caution. *Dose*, 1 to 3 grains. *Antidotes*, same as Phenazone. (Antikamnia, a proprietary drug, contains 70 per cent. of Acetanilide.)

**ACIDUM HYDROBROMICUM DILUTUM.** *Dilute Hydrobromic Acid.* Is given as a sedative in neuralgia and infantile convulsions due to teething. *Dose*, 15 to 60 minims.

**ACIDUM OSMICUM** (not official). *Osmic Acid.* Is used in dental microscopy as a staining reagent for colouring the myalin sheaths of spaces in medullated nerves and for interglobular dentine. Fat and medullary matter are blackened by it. It is also a hardening reagent.

**ACIDUM OXALICUM** (not official). *Oxalic Acid.* Used occasionally as a bleaching agent. The same precautions must be taken with this drug as with others when using it for this purpose, such as application of

rubber dam, plugging apical foramen, etc. Other drugs to be preferred. *Antidotes*, chalk or whiting (freely diluted), castor oil, stimulants, emetics.

**ACIDUM PICRICUM** (not official). **Picric Acid.** Is a decalcifying, hardening and staining reagent.

**ACIDUM SULPHUROSUM.** **Sulphurous Acid.** Is a parasiticide and is sometimes used as a mouth-wash in cases of thrush and fungoid affections of the mouth, in the strength of 1 part to 8 of water.

**ACIDUM TARTARICUM.** **Tartaric Acid.** Used in combination with chloride of lime as a bleaching agent. (*Dr. Gorgas.*)

**AGAR-AGAR** (not official). **Japanese Isinglass** (*Gelosin*). Used for making jellies for invalids and as a cultivating nidus for germs.

**ALUMINII CHLORIDUM** (not official). **Dr. Harben** recommends this as a bleaching agent in conjunction with hydrogen peroxide, chlorine being set free.

**ASEPTOL** (not official). A 3 per cent. solution is said to be useful in pyorrhœa alveolaris, in arresting the flow of pus, when applied to the pouches which form between the gums and teeth.

**ATROPINÆ SULPHAS.** **Atropine Sulphate.** Is used sometimes as an ingredient of devitalising pastes, but is not so effective as morphine. It is an anti-sialic.

**AURUM CHLORIDUM** (not official). **Gold Chloride.** Used in dental microscopy as a staining reagent.

**BISMUTH.** Used in the workroom for making fusible alloys.

**BISMUTHI SUBNITRAS.** **Bismuth Oxynitrate.** Given internally for vomiting due to gastritis, and for the diarrhœa of dentition. *Dose*, 5 to 20 grains.

**CANNABIS INDICA.** **Indian Hemp.** May be tried in

cases of neuralgia when other drugs have failed. It is one of the ingredients of "Bromidia." *Doses*; of the extract  $\frac{1}{4}$  to 1 grain, of the tincture 5 to 15 minims.

**CASSIA OIL** (not official). (See Cinnamon.)

**CEDAR OIL** (not official). Is a clearing agent.

**CELLOIDIN** (not official). Is a preparation of pure pyroxylin and is used as an imbedding medium for dental tissues.

**CERA FLAVA. Yellow Wax.** Used as a root filling combined with various antiseptics. Also for taking impressions, but has been superseded for this purpose to a great extent by various compositions, plaster of Paris and gutta-percha.

**CHLORETONE** (not official). Is a hypnotic, analgesic, antiseptic and obtundent of sensitive dentine. Is greatly advocated by our American confrères. *Dose* 5 to 24 grains, in cachet, capsule or tablet. "Dentalone" is chloretone dissolved in essential oils.

**COPAL** (not official). A gum resin used in the same way as mastich as a temporary filling, but is more frequently used as a varnish for the osteoplastics. It must be dissolved in ether (equal parts).

**DAMMAR** (not official). A gum resin used by some in the same way as mastich.

**DERMATOL** (not official). A trade name for subgallate of bismuth. It is a yellow powder resembling iodoform without its odour. It is an antiseptic and desiccative and used in the treatment of dead teeth.

**EXALGIN** (not official). This drug is used in the treatment of neuralgia. It can be prescribed in 2-grain doses.

**FICUS. The Fig.** Useful as a poultice in alveolar abscess, especially in young children. Heat one in

boiling water, split it open and place it between the gum and cheek.

**FUCHSINE** (not official). Is used in dental microscopy as a staining reagent, the red colour formed by it being fairly permanent.

**GUAIACOL** (not official). A derivative of Wood Creosote. Is an antiseptic and germicide and is sometimes used for putrescent pulps in preference to creosote of which it is the active constituent.

**HIRUDO. The Leech.** Only occasionally applied to the gum over the root of a tooth affected with acute periodontitis to relieve inflammation and congestion. A drop of milk on the gum, or a glass tube, will often facilitate the application.

**IRIDIS RHIZOME** (not official). **Orris Root.** It is used as an ingredient of dentifrices for its violet odour. (Use about  $\mathfrak{Z}\text{ii}$  to  $\mathfrak{Z}\text{ii}$  of precipitated chalk.) On account of its cathartic action infants should not be allowed to rub their gums with it.

**LANOLINE.** Is sometimes combined with arsenic and cocaine in devitalising pastes.

**LYSOL** (not official). A coal tar derivative. Can be used as an antiseptic and germicide. Very useful for sterilising instruments, as it is of a soapy nature. Mouth mirrors may be sterilised by washing in a 1 per cent. lysol solution. They need not be dried before insertion into the mouth, nor need they be warmed. The soapy liquid remains on the surface, and the image is always clear and well defined. The back of the mirror may be wiped with a piece of cotton-wool, but even if a drop gets into the mouth it does no harm. It is not to be confounded with lysoform. It consists of cresols only and has no formaldehyde in its composition.

**MEL. Honey.** This is generally used as a vehicle

for other drugs and, as regards the mouth, acts as a demuleent, relieving dryness and pain.

**OLEUM AMYGDALÆ.** *Almond Oil.* A soothing and pleasant application for excoriations of the lips, and to simple but painful ulcers of the gums, cheeks and tongue.

**OLEUM OLIVÆ.** *Olive Oil.* Useful as a local application when carbolic acid has been dropped on the gums, lips or face of a patient. It should also be given internally very freely, when the same or the mineral acids have been taken

**OLEUM RICINI.** *Castor Oil.* Given internally as a cathartic in doses of 1 to 8 drachms. Applied to the eye, it acts as a local sedative when any foreign body has flown into it.

**OS SEPIA (not official).** The powder is occasionally used as an ingredient of tooth-powders. Half a drachm to 2 ounces of precipitated chalk, with other ingredients, is quite enough.

**POTASSII BICHROMAS.** *Potassium Bichromate.* Is used as a hardening reagent in dental microscopy.

**PROTARGOL (not official).** This is a dust-like yellow powder containing 8·3 per cent. of silver organically combined, which is very soluble in cold water. Solutions should be protected from light and from contact with metals, and should not be heated. It is a non-irritating penetrating antiseptic and is used in the treatment of pyorrhœa alveolaris, and by some as a root-dressing.

**RESORCIN (not official).** It is an antiseptic and caustic. Must be used absolutely pure and should be kept from the light. For pyorrhœa a 10 per cent. solution is recommended (after cleansing the pockets with hydrogen peroxide) where there is impaired circulation of the tissues.

**SALOL** (not official). Antiseptic and antipyretic. The salol mouthwash consists of salol, saccharin, peppermint oil, alcohol, clove and earraway oil. It is very similar to "Odol."

**SAL ALEMBROTH** (not official). Is a double chloride of ammonia and mercury. Is a very powerful antiseptic and less irritating than mercuric chloride.

**SANDARACH** (not official). A Gum Resin. Used as a substitute for mastich and in the same way.

**SODII BROMIDUM. Sodium Bromide.** This is used for almost the same purposes as potassium bromide, but is not so depressing in its action. *Dose*, 5 to 30 grains.

**SODII SALICYLAS. Sodium Salicylate.** Is given internally for neuralgia, odontalgia and exostosis of the teeth of rheumatic origin; also in the treatment of acute tonsillitis. *Dose* 10 to 30 grains.

**SULPHONAL.** Useful as an hypnotic in cases of neuralgia pure and simple. It is given in doses of 10 to 30 grains, either in "eachets," hot beef-tea or brandy and water, and, as it is absorbed very slowly, should be taken two hours before sleep is required.

**TINCTURA CALENDULÆ** (not official). Marigold. Is used as a healing mouth-wash in the proportion of 1 drachm to 1 ounce of water.

**TINCTURA VALERIANÆ AMMONIATA.** Useful for neuralgia in hysterical patients. *Dose*  $\frac{1}{2}$  to 2 drachm, freely diluted.

**VERATRINE.** An Irritant Poison. The ointment by itself or combined with aconitine may be used in cases of neuralgia by rubbing over the seat of pain two or three times a day; but great care must be taken, as it is likely to be absorbed, even by an unbroken surface.



## POISONS USED BY DENTISTS, AND THEIR ANTIDOTES

IN any case of poisoning carry out the following directions :

(1) Send for medical assistance saying (if possible) what the patient has taken or what has been administered.

(2) If in doubt as to what has been taken, **give an emetic** of mustard and water, or a hypodermic injection of **Apomorphine**.

(3) Refer to the following :

POISONS.	ANTIDOTES.
<b>Aconite.</b>	Stomach tube, emetics of mustard and water, zinc sulphate or apomorphine, stimulants, recumbent position, inhalation of amyl nitrite, artificial respiration.
<b>Ammonia</b> (strong solution of)	Vinegar and water, lemon or orange juice, dilute acetic acid and water, demulcent drinks.
<b>Arsenic.</b>	Stomach tube, emetics of mustard and water, or apomorphine, magnesia in large quantities or dialysed iron (1 ounce), stimulants.
<b>Carbolic Acid</b> and <b>Creosote.</b>	Olive oil, stomach tube, emetics of apomorphine or mustard and water, Epsom salts or Glauber's salts ( $\frac{1}{2}$ oz. in $\frac{1}{2}$ pint of water), inhalations of amyl nitrite.
<b>Caustic Potash</b> and <b>Caustic Soda.</b>	Vinegar and water, lemon or orange juice, olive oil freely, demulcent drinks.
<b>Chromic Acid.</b>	Emetics, stomach tube, chalk and milk, demulcent drinks.
<b>Cocaine.</b>	Inhalations of amyl nitrite, stimulants, hypodermic injection of ether, artificial respiration.
<b>Copper Sulphate.</b>	Stomach tube, emetics, milk and eggs <i>ad lib.</i>
<b>Ethyl Chloride.</b>	Fresh air, stimulants, artificial respiration.
<b>Hydrochloric, Nitric, and Sulphuric Acids.</b>	Soap and water, any alkali, olive oil, milk and egg, hypodermic injection of morphine (stomach pump <b>not</b> to be used).
<b>Iodine.</b>	Stomach tube, emetics, starch and water, inhalations of amyl nitrite.



Mercuric Chloride.	Stomach tube, emetics, white of egg (unboiled), stimulants.
Silver Nitrate.	Common salt and water (freely), emetics, demulcents.
Amyl Nitrite.	Fresh air, recumbent position, artificial respiration.
Opium.	Stomach tube, emetics, keep patient moving about, cold douches, inhalations of amyl nitrite, artificial respiration. Application of electric battery if handy and in <b>working order</b> .
Oxalic Acid.	Alkalies, such as chalk, lime, or whiting, castor oil.
Zinc Chloride.	Albumin, milk, sodium or potassium carbonate (in large quantities), emetics, stomach tube.

## ANÆSTHETICS.

Nitrous Oxide Gas.	Pull the tongue forward, fresh air, amyl nitrite, artificial respiration.
Ether.	Pull tongue forward, clear mouth of mucus, artificial respiration, fresh air, alternate hot and cold douches to face and chest, amyl nitrite.
Chloroform	Never allow it to be given for tooth extraction.
<i>If inhaled—</i>	Pull tongue forward, fresh air, flap chest and face with end of wet towel, artificial respiration, invert patient, amyl nitrite.
<i>If swallowed—</i>	Stomach tube, emetics, amyl nitrite, rouse patient.

## HANDY EMETICS.

- 1.—Common salt.  
One tablespoonful in half a pint of tepid water.
- 2.—Mustard.  
Two tablespoonfuls in half a pint of tepid water.
- 3.—Put finger in the throat, or irritate fauces with a feather.

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